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Contractors and Engineers Monthly

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PICKS and SHOVELS

By O. E. POTTER

Old-Timer Passes On

Richard S. Morrow, one of the oldest dragline contractors in the West, died in January at the age of 79. The story of his life might also be called the story of construction in the West.

Born at Whitby, Ontario, he was working on a ranch in Montana when the Northern Pacific railroad was built. He joined a construction crew and stayed in railroad construction work until 1905, getting his engineering education "in the field" where many of our best and most successful contractors and engineers have secured theirs.

Specializing in dragline work, the firm of R. S. Morrow & Son handled many drainage projects in Nebraska and vicinity, including the construction of the 6,900-foot Federal irrigation tunnel near Gering, Neb., the Illinois-Central tunnel No. 3 at Grantsburg, Ill., and, in partnership with the Phelan-Shirley Co., of Omaha, the construction of the Detroit water works tunnel under the Detroit River.

It is with great regret that we witness the passing the "old-timers" who like Mr. Morrow got their training in the field and who brought to the jobs they tackled the practical knowledge, common sense and good judgement resulting from actual construction experience. These men did much to build this country, taking part in the development of the railroads, the highways, building the bridges and tunnels and water works which we have accepted as part of our present world. In the lives of some of these old-timers, the new-comers in the field of engineering construction can find much inspiration to carry on the work they started in accordance with the traditions and standards they established.

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Guniting a Canal near Glendale, Ariz.

Arizona Canal Lined

Water Conservation Project, Financed by RFC, Included Strengthening Dam and Other Improvements to System

By JOSEPH C. COYLE

MORE fertile land than that of Arizona's desert valleys is hard to find. Even those areas as yet untouched by the hand of man bear a comparatively luxuriant growth of vegetation, nourished by an extremely light and seasonal rainfall. Where irrigation waters have

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Concrete Paving On Relief Route to Missouri R. Bridge

(Photos on page 48)

M. E. Gillioz, Contractor, Completes Traffic Link Between New Bridge and St. Louis Express Hwy.

THE 1936 highway maps of St. Louis and vicinity show a pair of long dotted lines sweeping cross country from the vicinity of Richmond Heights, a suburb of St. Louis, around Bellefontaine and Chesterfield and finally reaching a site on the Missouri River marked "Bridge under construction." Along the dotted route it reads "New location of Federal Route 40, under construction." Of this traffic relief route M. E. Gillioz built 6.5 miles in 1935 and 1936. This NRH project included grading, bridges and paving. The grading was started on July 11, 1935.

One fill averaging 6 feet high carries this road across a bottom land for a distance of 5 miles. To build this fill Gillioz used six borrow pits along the right-of-way and hauled a maximum of 1¾ miles at the west end and an average of 1 mile for the entire length of the fill. Where the pavement is 40 feet wide the embankment is 56 feet wide at the top and for the 30-foot pavement, it is 46 feet wide.

The fill was jetted for the entire length, as Missouri specifications require the jetting of all fills more than 3 feet high. For this work a Blackwell hydraulic jetting machine was used effectively. When ponding the jetted areas, the contractor used a Caterpillar Thirty and Galion No. 10 grader to build the dikes, and taps in the water supply line furnished the jetting and ponding water. Water was secured from Bon Homme Creek, at the east end of the job, and pumped to the 3-inch line by a triplex pump. At the west end a 4-inch well-point was driven into the swampy ground and water was pumped to the line with another triplex.

The Pavement

The contract was divided into about 4.5 miles of 30-foot pavement and 2.0 miles of 40-foot pavement. The 30-foot section was poured as a 20-foot slab followed by a 10-foot strip, and the 40-foot pavement was poured as two 20-foot pavements. There was no crown on the super-elevated curves but the remainder of the pavement was crowned 4 inches. The pavement has a thickened edge 9 inches thick for the 2 outside feet, then is reduced uniformly to 7 inches in the next 2 feet and thereafter is 7 inches thick.

Batching

The aggregates for the job were stockpiled at two locations along the right-of-way. The first was at the east end of the job and the second at about the center and in a cornfield. The gravel was hauled 11 miles and the sand was dredged from the Missouri River about

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Attention to Details Saves Coulee Dollars

By HENRY W. YOUNG

(Photos on page 48)

In Every Part of Job Ingenious Devices and Methods Account for Rapid Progress of Work

THE Mason, Walsh, Atkinson, Kier Co. is doing things on such a big scale at Grand Coulee that the first-time observer can do little more than keep his eyes open and his jaw propped up and try to take in a few of the "biggest in the worlds" and "first time ever's." After a few visits, however, he begins to see that in the execution of the great undertaking there are evidences everywhere that just as much attention is paid to the comparatively little things and the easy and economical ways of doing them as on any other construction job. Just a few examples are recorded here.

Making Truck Bodies Larger

In the heavy truck and tractor shop, where Mort Lederer is Foreman, they have the equipment and the men to rebuild a truck from the ground up. This includes even the motors, transmissions and rear-end assemblies. The contractor does not order specially-built trucks for the particularly difficult service requirements here. Instead, he takes the best standard trucks on the market and then "Couleeizes" them.

Take the matter of bodies. Mort finds that the trucks at certain places on the job have the power to drag away a yard or two more material to the load if the bodies were only larger. Does he say that he will wait until the next lot of trucks are ordered and then get bigger bodies? Hardly! He calls for some welders from the welding shop next door and they proceed to weld two or three courses of 3-inch steel pipe to the top edges of the bodies, one above another.

Makes His Own Boring Machine

In building the special forms for concreting, wood working operations go forward on a Grand Coulee scale. In one of the numerous form shops, a carpenter had to bore holes in a great number of standard size timbers. Perhaps there is a boring rig manufactured somewhere that would have suited him exactly. But life was too short and time altogether too fleeting for him to try to wrangle it out of the purchasing department. Instead, he took his Ingersoll-Rand CCW portable drill and mounted it on his bench horizontally, as shown in the photograph on page 48. Then he bolted a timber to the bench transversely, ahead of the drill, with a hole through it as a guide for the auger. At the end of the bench, he made a sliding

(Continued on page 36)

It's a "Pipe" to Make Truck Bodies Larger by Welding

Yucca Plants Placed Behind Direction Signs Along the Highway Attract the Driver's Attention

Roadside Parks Along Texas Roads

State Highway Dept. Provides and Maintains 500 Rest and Picnic Parks for Safety and Pleasure of Motorists

By ALLEN P. CHILD

FOR the use of the tourist and the citizen of Texas alike, the highway forces of the State of Texas have inaugurated and maintain a system of five hundred free roadside parks. In these parks the motorist may find pleasant spots to rest, where the children may play in safety or where he may enjoy a picnic lunch or the meal of a wayfaring sightseer.

With the rapid increase of motor travel in Texas at all seasons of the year, due to improvement in highway surfaces during the past few years, there has been a realization by the State of the urgent need for a number of small roadside parks which would discourage promiscuous roadside parking. When sleep overpowers a driver and he seeks to make a hurried stop on the highway shoulder he is probably unwittingly contributing to accidents either to his own car or to the cars or persons of those who can manage to stay sufficiently wide awake to continue driving. The tourist or resident driver who uses the shoulder of the road for picnic lunches or family meals does his share to litter up the roadside and at the same time may be inviting disaster to himself and his family as well as to his property, if he has selected a stopping place where every condition of safety has not been provided.

Acquisition of Land

For a period of two years, sites have been acquired and at the present time the state has under control five hundred of these parks which are maintained by highway maintenance crews for the free use of the motoring public. Plots of ground along the highways have been donated by property owners in many instances. The average size of the parks is from one to three acres. Where the presence of particularly fine clumps of trees have made sites desirable for parks and owners would not give the site to the state, civic organizations in some cases purchased the land and then deeded it to the state.

Planning the Parks

Local characteristics, instead of standardization, are taken advantage of in laying out and furnishing the roadside parks. Tables and benches are furnished in all of the parks for the convenience of those desiring lunch facilities. Not all of the parks have water available, mainly in the arid stretches of western Texas, but wherever possible wells have been drilled and pumps supply the motorist's water needs. A great many of the parks are provided with stone or

(Continued on page 11)

Stabilized Contract Of 8 and 13 Miles On Minnesota Highway

S. J. Reader of St. Paul and Halvorsen Brothers of Spring Grove, Minn. Join in Work

(Photos on page 48)

ON Minnesota trunk highway No. 58, S. J. Reader Co. and Halvorsen Bros. joined forces in attacking the problem of laying 8 miles of stabilized gravel base and surface courses between Zumbrota and Goodhue and 13 miles of crushed limestone base and surface courses from Goodhue to Red Wing.

Stabilized Courses

The stabilized gravel base and surface courses required 36,905 tons of gravel material with an average haul of 6 miles, and 6,853 cubic yards of clay binder soil with an average haul of 3 miles. In the 3-inch surface course, 110 tons of calcium chloride was mixed on the road with the gravel and binder soil.

Gravel for the 3-inch base course was crushed and screened to 1¼-inch maximum size, and for the surface course to ¾-inch maximum size. The detailed specifications for stabilized gravel are:

	Base Course	Surface Course
Per cent passing 1¼-inch sieve	100	
Per cent passing ¾-inch sieve	80-100	100
Per cent passing ⅝-inch sieve		95-100
Per cent passing ⅜-inch sieve	65-95	70-95
Per cent passing No. 10 sieve	30-65	35-65
Per cent passing No. 40 sieve	15-40	20-40
Per cent passing No. 100 sieve	10-30	15-30
Per cent passing No. 270 sieve	6-20	10-20
Plasticity Index	4-15	6-15

Construction of the stabilized gravel base and surface courses 32 feet in width started June 1. The work went on 16 hours a day and was completed on June 27.

The net working time at the gravel screening and crushing plant was 269 hours, giving an average of 137 tons an hour. About 10 per cent of this material was oversize and required crushing. A Diamond screening and crushing plant was used and loading was done with a Caterpillar Thirty-Five and a 3-yard La Plant-Choate hydraulic scraper. Twenty-five trucks, loaded to 4 tons on a platform scale direct from the delivery belt, took care of the gravel hauling.

Clay binder soil was loaded from a roadside pit through a trap with a Caterpillar Thirty-Five and a 1½-yard rotary scraper. Hauling the binder soil was handled by five trucks.

The gravel material was dumped in a windrow on one side of the road bed while the binder soil was windrowed on the opposite side. After the pulverizing of the latter, which was handled with a Caterpillar Thirty-Five and a series of farm discs, the materials were mixed with two Caterpillar Sixties and 12-foot blades. Water was applied at an average rate of 1.75 gallons per square yard during the final stages of the mixing and shaping operations. Compaction was obtained by rolling with partially-loaded dual-wheel trucks.

The Quarry

The crushed stone base and surface courses required 65,429 tons of crushed limestone. The quarry was located midway between Goodhue and Red Wing. Work on this section of the project started June 10.

In the quarry three men with jack hammers drilled with Timken detachable bits for the smaller shots and for the large as well. The bits were sharpened in the machine shop at the crushing plant with an emery wheel. In the quarry a Schramm 220 and a Sullivan 110-cubic foot compressor furnished the air for the drills. In addition to the drillers, there were three laborers, a powder man and a shovel operator.

The holes were drilled to a maximum depth of 16 feet and were shot with Atlas 40 per cent low freezing powder. The stone was a moderately hard limestone.

The contractors brought down 55,000 tons of rock in one large blast that used 8 tons of dynamite placed in coyote holes tunneled 50 feet into the ledge. The rock required a considerable amount of blockholing even after this large shot. A ⅝-yard Speeder shovel loaded the rock into two 2½-ton International trucks which hauled it a few hundred feet to the hopper over a 14 x 36-inch Cedar Rapids jaw crusher set for 3-inch maximum rock. Two men with stone hooks kept the large stones running in proper position to get the maximum output from the crusher which was run by an old Hart-Parr 28-50 gas traction engine.

C. & E. M. Photo

Light Truck Spreading Crushed Limestone for Stabilized Base

Crushing and Screening

The stone from the primary crusher was delivered to a Pioneer screening and crushing plant equipped with a horizontal shaker screen for ⅝-inch material. The specifications for the road material require that 100 per cent pass a ⅝-inch screen, 70 to 90 per cent pass a ⅜-inch screen, 20 to 45 per cent pass a No. 10 sieve and 5 to 20 per cent pass a 100-mesh sieve. All oversize material ran off the end of the horizontal screen and went to the rolls which were set at ½-inch. All material from the rolls went to a pit beneath the machine

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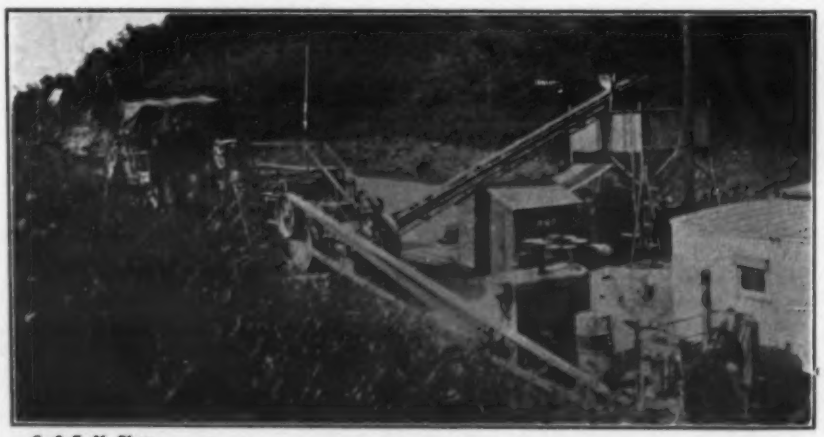

C. & E. M. Photo

An Unusual Drive for a Combined Crushing and Screening Plant Which Furnished the Aggregate for 21 Miles of Stabilized Road Construction

Permanent Drains Aid Construction

Christensen & Gardner Installed Drain Ahead of Excavation to Dewater Underpass Job

IN ground that might well have called for wellpoints, the State Road Commission of Utah beat the gun and unwatered the swampy ground around the West 33 South Street underpass on U. S. 50 under the Denver, Rio Grande and Western Railroad in Salt Lake City by placing the permanent drains before roadway excavation was started and pulling all the water out to the sump at the west end of the underpass.

The site for this underpass, for which Christensen & Gardner of Salt Lake City was the contractor, was one at which ground water was encountered within a few inches of the ground surface and it constituted part of an extensive artesian basin. When preliminary designs were being considered for this site, it was necessary for the State Road Commission to consider very carefully this ground water condition, since an overhead type of structure would have created quite an unsightly condition on the landscape and would have materially affected property values in the immediate vicinity.

Therefore, in order to counteract the buoyancy effect of the ground water when considering an underpass structure, a dry dock type for the entire length of the depressed profile would have been very expensive in view of the fact that the roadway width to be constructed was 40 feet between curbs. Therefore, plans were considered embracing the possibility of constructing a pervious wall around the entire depressed portion of the profile in order to intercept the inflow of ground water. A test hole 8 feet square was sunk as a shaft and it was found that the material through which the excavation was made was composed of reasonably tight clay containing thin layers of sand and other small channels in the clay which permitted the flow of the subterranean water.

The flow of the ground water was measured during this test and this information was used in determining the size of the pumps to be installed. When it was found that the actual flow of the ground water was comparatively small, it was decided to proceed with the design of the structure based on the use of this pervious wall. A trench was excavated 3 feet in width and 18-inch perforated pipe laid 1 foot from the bottom of the trench and the remainder of the trench then filled with coarse gravel. The bottom of the trench throughout

(Continued on page 43)

The country needs thousands of miles of roads like this one

Constructing low-cost TEXACO Asphalt surface of plant-mix type at Fort Logan, Colo. Small photo shows the completed surface.

This recently constructed road surface at Fort Logan, Colo., with its 2-inch compacted thickness, is resilient, durable and skid-proof. Equally interesting is the comparatively low cost at which it was built.

Coarse graded river gravel and TEXACO MC Surfacing Material No. 4 were mixed cold in a plant, trucked to the road, leveled by blade grader and compacted by a 10-ton roller. The surface obtained is fully adequate for the traffic served. It is fully adequate for the traffic served by thousands of miles of the country's roads and streets.

And its moderate cost insures year-around Good Roads for the greatest possible number of a community's taxpayers.

Fully investigate this economical plant-mix type of surface when planning your 1937 road or street program.

TEXACO

ASPHALT

THE TEXAS COMPANY, Asphalt Sales Department, 135 East 42nd Street, New York City
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The Gas Tax Payer Packs a Punch

A "crepe-hanger" crept up to me at the Road Show and said "Well, the road building boom can't last much longer. People won't stand for more bond issues and the politicians have got their teeth into the gas tax money and won't let go." Then with a Dick Deadeye leer and a sneer he went outside. That man is dead wrong, and unfortunately there are a lot of dyed-in-the-wool road builders who passively take the same attitude.

Thank God not all road builders and road users are like that. We have a grand bunch of individual scrappers in the heavy-weight class, and we have the American Road Builders' Association and the American Automobile Association, as well as an awakened voting public. The politicians may have had their hands in the coffers of highway funds and dislike to stop playing with that money, but some of them, with an ear to the ground, have already come out against further misappropriation of highway funds. Their Excellencies the Governors of Arkansas, California, Illinois, Iowa, Maryland, Nevada, New Jersey, New Mexico, North Carolina, Oregon, Utah, Vermont and Wyoming have gone on record as opposing gas tax diversion.

Then let us take a look at what the voters have accomplished by the pressure they have brought to bear. A personal poll of the Rhode Island Senate showed that its members stood 20 to 2 against diversion with 8 not recording their stand, and in the House of Representatives 38 opposed diversion, 3 favored it and 26 expressed no opinion.

Colorado has a constitutional amendment prohibiting diversion of highway funds on and after July 1, 1935. The State Supreme Court of Kansas has decided that taxes on gasoline and registration fees for motor vehicles are collected for a specific purpose and that the Legislature has no authority to appropriate these funds for any other purposes than for the construction and maintenance of state highways.

A constitutional amendment in Minnesota passed by the voters at the election of November 8, 1932 and which became effective November 28, 1932, directs that all motor vehicle taxes must be paid into the trunk highway sinking fund.

Back in 1928, Missouri adopted, by initiative petition, a $135,000,000 state highway bond issue to be retired by gas tax monies and registration fees for motor vehicles and all money collected in excess of that necessary for retiring the bonds must be paid into the State Road Fund. The State Supreme Court of New Hampshire, in reply to a formal set of questions presented to it by the State Legislature in 1923, expressed the opinion that gas tax money must be used for highway purposes and that if the money were used otherwise it would be unconstitutional.

A referendum vote on September 14, 1936, in Maine approved an anti-diversion law which requires that all income from highways including taxes on internal combustion engine fuel, from fines, forfeitures and costs accruing to the state and from permits granted by the State Highway Commission to open highways should all be segregated and become a part of the general highway fund.

In Massachusetts a petition carrying twice the required number of signatures has already been filed with the Secretary of State for a constitutional amendment restricting the use of the proceeds derived from motor vehicle registration fees,, licenses and gasoline excise taxes, excluding only the motor vehicle excise tax, to be used for the necessary costs of administration, construction, reconstructing, maintaining, repairing, improving and policing public highways and bridges within the Commonwealth of Massachusetts. Constitutional amendments are now being sponsored also in Alabama, North Carolina and in Pennsylvania, and laws to prevent diversion of highway revenues are under consideration in Washington, Wisconsin, New Jersey, Georgia and Idaho.

In a statement to Charles M. Upham, Engineer-Director, American Road Builders' Association, recently Senator Hayden said "The enactment of state laws diverting gasoline and other motor vehicle taxes from highway purposes to other uses can only be construed by the National Congress as a clear indication that these states are not interested in the continuation of a program of highway construction and consequently do not care to continue to receive the benefits of Federal-Aid for roads."

The tax-payer is creating a rosier picture by his fight to limit the misappropriation of motor vehicle license and gas tax funds. It is hoped that more tax-payers in many other states will join this movement for the universal application of highway taxes to highway services.

Highway Upkeep Cost Minn. $8,000,000 in 1936

Maintenance expenditures on the Minnesota trunk highway system of 11,340 miles amounted to approximately $8,000,000 in 1936, compared with an expenditure of about $7,500,000 in 1935, according to an estimate by N. W. Elsberg, State Highway Commissioner.

It is estimated that it cost each Minnesota motorist about 80 cents a month to pay all costs of maintaining the trunk highways last year, the cost per mile of road per month averaging about $58.

After three years' experience in operating the expanded state highway system, the state maintenance engineers have recommended an annual maintenance budget of $8,500,000. Snow plowing and the spring breakup damage, which is greatly increased by removal of the snow, take about $2,000,000 of the maintenance funds annually.

During 1933 and 1934, maintenance expenditures were held down far below normal because of lack of funds. Substantial increases in 1935 and 1936 were necessary to protect Minnesota's huge investment in its highways, and in the interest of public safety. Mr. Elsberg expressed the belief of the Minnesota Highway Department that a high level of maintenance should be insisted upon in the future, because it is cheaper to keep roads uniformly in good condition than to let them deteriorate and then pay extra costs to restore them.

Counties Fight Snow With N. Y. State Money

Under the procedure followed in New York State, the work of clearing the highways is divided, according to the Bureau of State Publicity. County authorities are responsible for state and county thoroughfares, while secondary and town roads are looked after by township authorities. The state assists only with financial aid. New York is organized for battle, so to speak, on a county basis and each county usually coordinates its work with adjoining counties so that traffic may be uninterrupted. Thus the motorist may journey safely and freely on all important highways.

With the first indication of a substantial snowfall, the county superintendent of highways and his county engineer muster their men by telephone in the various road maintenance districts. Each district is in charge of a foreman who directs the work in his section. The main state and county highways, which have been scheduled for prompt attention by the snow removal forces are attacked immediately. Work continues steadily as long as the storm continues and until the roads are cleared.

To avoid any possible delay in preparing against an approaching storm, the highway authorities also keep in close touch with the local weather bureau by telephone. Thus the intensity of the storm may be determined with fair accuracy hours in advance and the men and machinery ready when they are needed.

Of the fifty-seven counties in the state of New York, outside of New York City, which is not involved in the county snow-removal plans, it is stated in an account of New York State's snow fighting activities in the *Telephone News Bulletin* that Albany County has one of the best snow-fighting systems. In general, the snow removal work there typifies the work throughout the state.

Albany County is divided into nine districts for its snow removal work. The foreman in each district reports directly to the county engineer, generally by telephone from various points along the route of the work. The county engineer is thus able to report to the newspapers and automobile bureaus and other agencies the necessary information concerning the extent of the storm, the dangers to be encountered on the highways and the progress of the work. In unusually heavy storms, the radio is used to broadcast this information to the traveling public.

The snow removal equipment of this county includes twenty-one truck plows and twelve tractors. The truck plows are fast-moving vehicles which start out when the snow is only a few inches deep and stay out as long as the storm continues. The tractors, equipped with push plows, are used for bucking the heavy drifts. Rotary plows are also used against the heavy drifts.

The erection of snow fence along the highways has become a highly effective means of preventing snowdrifts. Each county has not only gradually increased the miles of highway thus protected but has studied the snowfalls carefully to determine where drifting is likely to occur. This method of control, it is believed by highway authorities, has tended to reduce snow removal largely to a more or less routine proposition.

NATIONAL SAFETY COUNCIL

$200,000,000 Federal Aid for Highways in 1937

The apportionment to the various states of $125,000,000 of regular Federal-Aid for improvement of the Federal-Aid highway system, $25,000,000 for improvement of secondary or farm-to-market roads, and $50,000,000 for elimination of hazards at grade crossings has been made by Secretary of Agriculture Wallace for the fiscal year beginning July 1, 1937.

All of these funds will be expended in accordance with the general plan used in previous Federal-Aid highway work. Projects for improvement will be selected by state highway departments, which will also prepare plans, let contracts and supervise construction, subject to Federal approval.

The states are required to match the funds for improvement of the Federal-Aid and secondary roads. It is not required that the grade crossing funds be matched. Funds for use on the Federal-Aid system are now available for improving extensions of the systems through cities.

Improvement of secondary roads and the elimination of grade crossings with Federal funds were first initiated as an emergency measure to relieve unemployment. The new apportionments of funds for these purposes are the first to be made a regular part of the Federal program.

The amounts apportioned to the states are shown in the following table:

APPORTIONMENT OF HIGHWAY FUNDS FOR THE FISCAL YEAR 1938

State	Regular Federal Aid	Secondary or Feeder Roads	Grade Crossings	Total
Ala.	$ 2,664,693	$ 532,939	$ 1,015,170	$ 4,212,802
Ariz.	1,829,952	365,990	314,594	2,510,536
Ark.	2,187,752	437,550	893,403	3,518,705
Calif.	4,858,220	971,644	1,874,656	7,704,520
Colo.	2,336,054	467,211	657,357	3,460,622
Conn.	805,426	161,085	426,784	1,393,295
Dela.	625,000	125,000	250,000	1,000,000
Fla.	1,704,765	340,953	712,816	2,758,534
Ga.	3,233,279	646,656	1,223,099	5,103,034
Idaho	1,570,687	314,137	418,115	2,302,939
Ill.	5,238,798	1,047,760	2,644,980	8,931,538
Ind.	3,149,011	629,802	1,308,113	5,086,926
Iowa	3,291,322	658,264	1,410,787	5,360,373
Kans.	3,374,126	674,825	1,307,669	5,356,620
Ky.	2,349,316	469,863	919,174	3,738,353
La.	1,829,490	365,898	799,226	2,994,614
Maine	1,122,670	224,534	352,448	1,699,672
Md.	1,043,938	208,787	519,993	1,772,718
Mass.	1,769,936	353,987	1,047,500	3,171,423
Mich.	3,893,528	778,706	1,464,807	6,337,041
Minn.	3,495,178	699,036	1,342,809	5,537,023
Miss.	2,247,708	449,542	806,707	3,503,957
Mo.	3,877,890	775,578	1,528,920	6,182,388
Mont.	2,621,728	524,346	671,204	3,817,278
Nebr.	2,641,423	528,285	892,976	4,062,684
Nev.	1,632,385	326,477	250,000	2,208,862
N. H.	625,000	125,000	250,000	1,000,000
N. J.	1,701,826	340,365	997,689	3,039,880
N. M.	2,040,685	408,137	432,291	2,881,113
N. Y.	6,258,857	1,251,771	3,424,399	10,935,027
No. Car.	2,998,371	599,674	1,244,662	4,842,707
No. Dak.	1,996,414	399,283	803,068	3,198,765
Ohio	4,640,344	928,069	2,141,704	7,710,117
Okla.	2,995,620	599,124	1,156,175	4,750,919
Ore.	2,092,368	418,474	588,377	3,099,219
Penn.	5,434,356	1,086,871	2,905,671	9,426,898
R. I.	625,000	125,000	250,000	1,000,000
So. Car.	1,722,188	344,438	752,928	2,819,554
So. Dak.	2,084,100	416,820	694,096	3,195,016
Tenn.	2,681,110	536,222	958,753	4,176,085
Texas	7,957,610	1,591,522	2,724,825	12,273,957
Utah	1,447,780	289,556	322,885	2,060,221
Vt.	625,000	125,000	250,000	1,000,000
Va.	2,328,369	465,674	941,656	3,735,699
Wash.	2,002,877	400,575	767,991	3,171,443
W. Va.	1,390,447	278,089	671,712	2,340,248
Wis.	3,107,053	621,411	1,252,871	4,981,335
Wyo.	1,600,350	320,070	344,961	2,265,381
D. C.			250,000	250,000
Hawaii	625,000	125,000	250,000	1,000,000
P. R.	625,000	125,000	369,959	1,119,959
Total	$125,000,000	$25,000,000	$50,000,000	$200,000,000

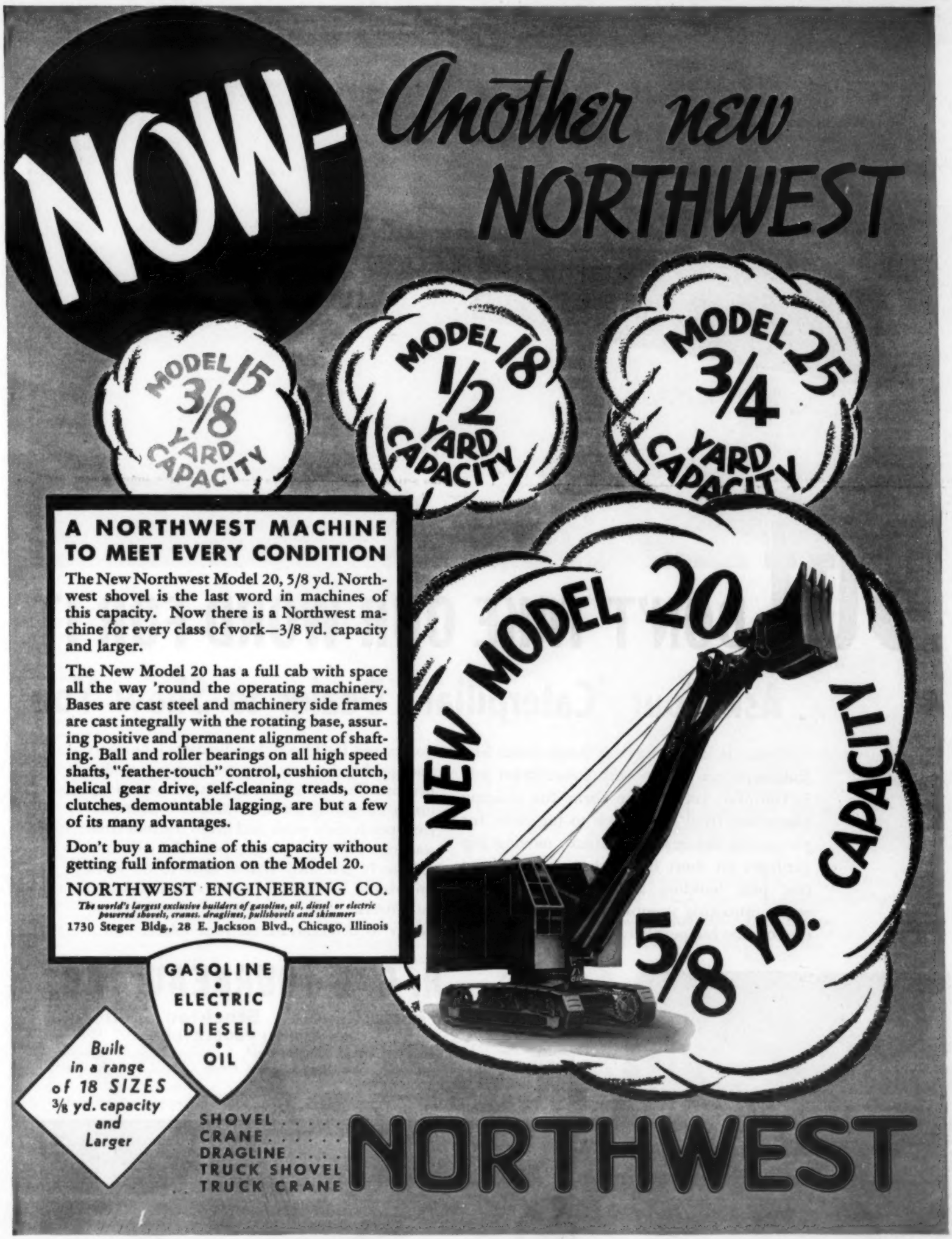
Asphalt Conferences Start Again This Year

The Asphalt Institute, New York City, has announced, following the recent meeting of its Board of Directors in New Orleans, that a National Asphalt Conference will be held this year, the time and place to be announced later. This annual meeting, formerly known as the Asphalt Paving Conference, is to be broadened because of the importance of new uses for asphalt developed within recent years. In addition to serving as a clearing house for ideas on the building of more and better roads economically, this year's Asphalt Conference will deal also with asphalt in relation to flood control and the protection of harbors through asphalt jetties.

The Institute also announced the election of nine additional asphalt producing companies to membership, bringing the total membership up to thirty-five. Following is the list of the new members: Anderson-Prichard Oil Corp., Oklahoma City, Okla.; Col-Tex Refining Co., Oklahoma City, Okla.; Cosco Oil Co., Fort Worth, Texas; Cosden Oil Corp., Fort Worth, Texas; Magnolia Petroleum Co., Dallas, Texas; Exeter Refining Co., Long Beach, Calif.; M. M. McCallen Refining & Producing Co., Huntington Beach, Calif.; The Petrol Corp., Los Angeles, Calif.; San Fernando Refining Co., San Fernando, Calif.

California Distributors For Williams Buckets

The Wellman Engineering Co., Cleveland, Ohio, has announced the appointment of The Rix Co., 582 Sixth St., San Francisco, Calif., and LeRoi-Rix Machinery Co., 3817 Santa Fe Ave., Los Angeles, Calif., as distributors for the complete line of Williams clamshell and dragline types of buckets in the California territory.


NOW-
Another new
NORTHWEST
MODEL 15
3/8
YARD
CAPACITY
MODEL 18
1/2
YARD
CAPACITY
MODEL 25
3/4
YARD
CAPACITY
A NORTHWEST MACHINE TO MEET EVERY CONDITION
The New Northwest Model 20, 5/8 yd. Northwest shovel is the last word in machines of this capacity. Now there is a Northwest machine for every class of work—3/8 yd. capacity and larger.
The New Model 20 has a full cab with space all the way 'round the operating machinery. Bases are cast steel and machinery side frames are cast integrally with the rotating base, assuring positive and permanent alignment of shafting. Ball and roller bearings on all high speed shafts, "feather-touch" control, cushion clutch, helical gear drive, self-cleaning treads, cone clutches, demountable lagging, are but a few of its many advantages.
Don't buy a machine of this capacity without getting full information on the Model 20.
NORTHWEST ENGINEERING CO.
The world's largest exclusive builders of gasoline, oil, diesel or electric powered shovels, cranes, draglines, pullshovels and skimmers
1730 Steger Bldg., 28 E. Jackson Blvd., Chicago, Illinois
NEW MODEL 20
5/8 YD. CAPACITY
GASOLINE
ELECTRIC
DIESEL
OIL
Built in a range of 18 SIZES 3/8 yd. capacity and Larger
SHOVEL
CRANE
DRAGLINE
TRUCK SHOVEL
TRUCK CRANE
NORTHWEST

Foundation Dewatering At Chickamauga Dam

Griffin Wellpoint Corp., 725 E. 140th St., New York City, was awarded the contract by the Tennessee Valley Authority to furnish a wellpoint system to dewater a portion of the foundation for the Chickamauga Dam at Chattanooga, Tenn. The system consisted of 125 Griffin Jet 'N Drive wellpoints, 300 feet of 8-inch header line complete with all swings, valves, fittings, etc., and a Griffin 8-inch electric-driven wellpoint pump with a capacity of 2,400 gpm.

In some locations where the engineers encountered rock at a higher level than was expected, making it impractical to install the system, the pump was placed in operation at a sump and successfully handled all the ground and surface water.

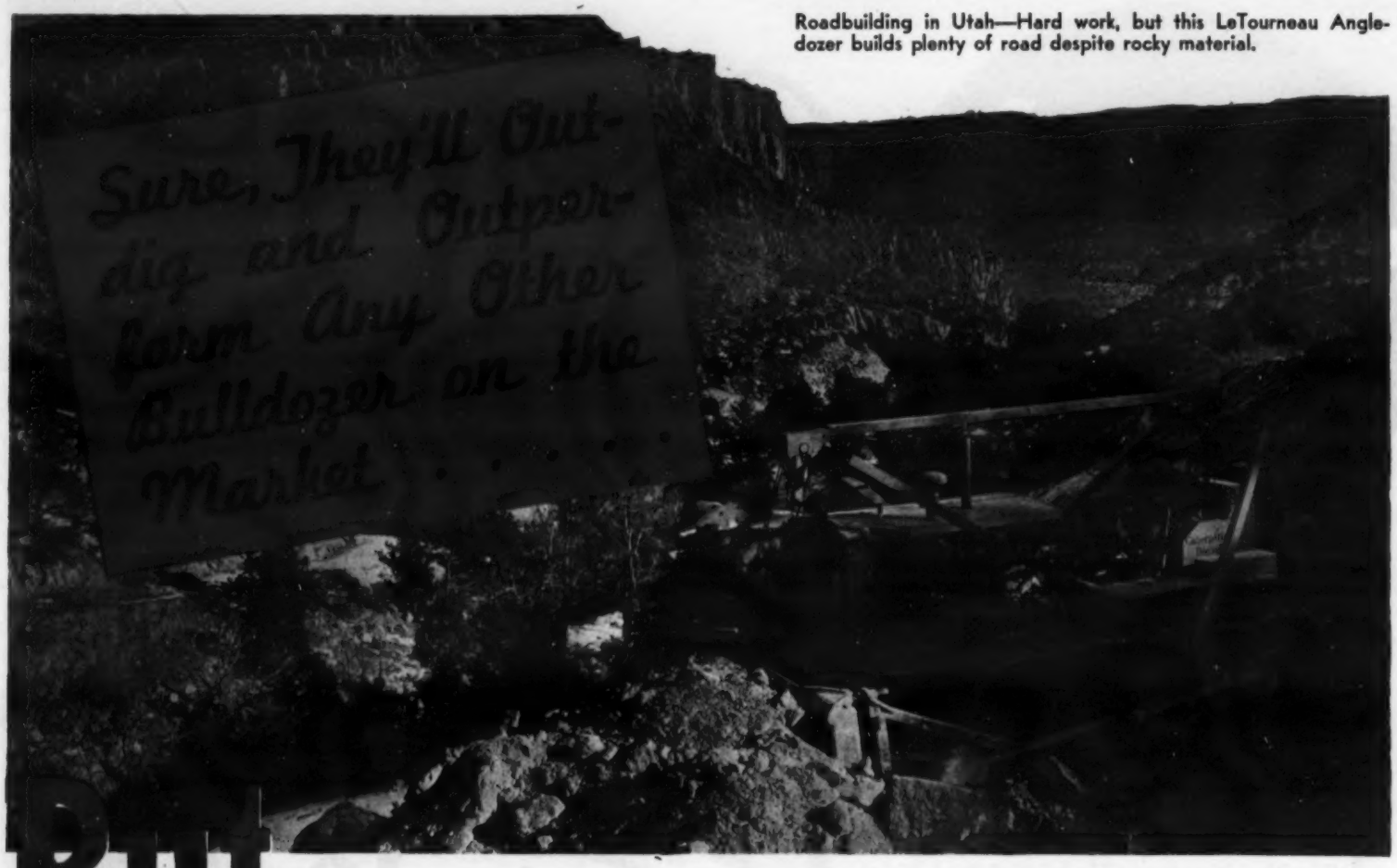
This application of the Griffin pump bears out the manufacturer's claim that the pump is so designed that it is not limited to wellpoint work but can also be used for any type of open pumping.

New Toncan Culvert Sales Company in Indiana

The Toncan Culvert Manufacturers Assn., Republic Bldg., Cleveland, Ohio, has announced the formation of a new company which will represent Toncan iron drainage products in Indiana. The new company has taken over the business and affairs of the Indiana Culvert Division of the Truscon Steel Co., of Indianapolis, and will be known as The Indiana Toncan Culvert Co., with offices at 802 Inland Bldg., Indianapolis, Ind.

W. H. Hampton and D. R. Sanders, long connected with the selling and promotion of Toncan drainage products, are the principals of the newly-formed company.

Roadbuilding in Utah—Hard work, but this LeTourneau Angledozer builds plenty of road despite rocky material.



BUT DON'T TAKE OUR WORD FOR IT

. . Ask Your "Caterpillar" Dealer to Show You

There are uses galore for Angledozers and Bulldozers on nearly every construction job. LeTourneau owners use them for clearing everything from light brush to big trees, for pioneering mountain-side roads, moving big yardages on short hauls, shaving dirt from coal pits, building and maintaining truck roads, uprooting stumps and rocks, crowding ore to mine hoppers, etc. LeTourneau Angledozers and Bulldozers handle these jobs easily and quickly, because they are designed to dig, because they have the strength to stand up under punishing work, because fast cable control speeds their work and keeps tractors from stalling, because a high, powerful lift and extremely low drop enable them to do work impossible to conventional trailbuilders and bulldozers. Ask your "Caterpillar" tractor dealer to demonstrate on your job.

Low drop enables this Angledozer to get down into ditches and under rocks and roots. It's operated by a LeTourneau Front End Power Control Unit, which leaves the rear of the tractor free for mounting another Power Control Unit or other auxiliary equipment.

R. G. LE TOURNEAU, INC.

Peoria, Illinois Stockton, California

Cable Address: "BOBLETORNO"

Manufacturers of: Angledozers*, Bulldozers, Carryall* Scrapers, Buggies*, Cranes, Drag Scrapers, Power Control Units, Rooters*, Semi-Trailers.

*Name registered U. S. Patent Office.

LETOURNEAU

New Fountain Creek Bridge Of Concrete and Girder Type

Frank M. Kenney, Contractor, Builds Structure to Replace Old Bridge Washed Out in the 1935 Floods at Colo. Spgs.

THE spring floods in Cheyenne and Fountain Creeks, Colorado, accounted for most of the bridges that went out in 1935, leaving Colorado Springs isolated except for one bridge west of the city. Rapid work on the part of state highway department engineers started a new chain of structures on their way to completion. The new structure just south of Colorado Springs on State Route 1 and over Fountain Creek completes the replacements.

The contractor started work about April 10, 1936, on pier 3 by excavating to 1 foot into the shale with a ¾-yard Koehring dragline after the material had been broken up with paving breakers. Some of the last material was taken out by hand and further work inside the sheet piling was done with a clamshell. The first 5 feet of excavation was in open cut but then rough wood sheet piling was driven. The same methods were used on the other pier and the two abutments, except that abutment 1, the northerly abutment, and pier 2 at the same end, required about 8 feet of dry excavation in original ground and the removal of a number of large trees.

Piers—Forms and Rubbing

The form lumber for the piers was 1 x 8-inch shiplap with 4 x 4-inch studs and wales on 18-inch centers. Wire ties were used throughout, cut off ¼-inch back in the concrete and plugged. Later when the surface was rubbed with Carborundum stone in a Mall surfacing unit these spots cleared up entirely, leaving a uniformly smooth surface.

The piers were poured in two lifts with Class B concrete to the bottom of the caps. Class B concrete was batched with 355 pounds of sand, 410 pounds of crushed stone and 68 pounds of water per bag of cement. Class A concrete, used for caps, abutments and the deck, was batched with 330 pounds of sand, 335 pounds of crushed stone and 62 pounds of water per bag of cement.

Setting the Girders

Eight girders supported the deck in each span with a depth of 5 feet ½ inch. These cantilevered 18 feet 9 inches over each of the piers from the abutments and the center girder of each line was suspended with a fixed joint at the north end and a rocker similar to the end rockers built into the girder at the south end. The girders measured 106 feet 3 inches from the abutment end and the center or intermediate girders 87 feet 6 inches. The center span of the structure is 125 feet.

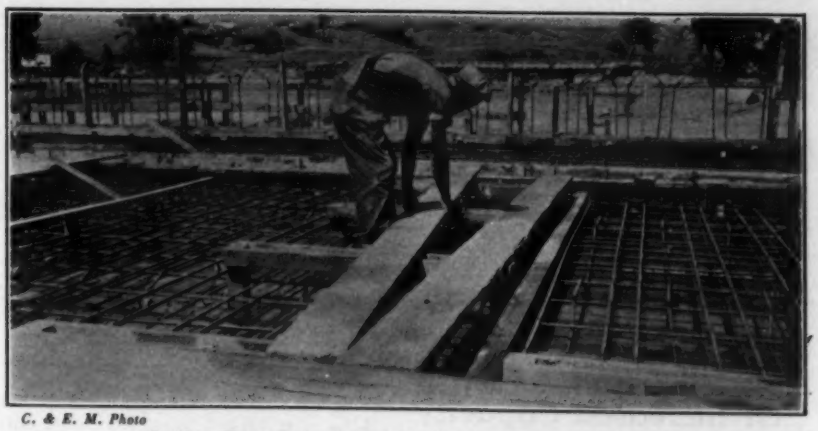
The girders were fabricated by the Virginia Bridge Co. at its Tennessee plant and delivered to a siding in Colorado Springs for hauling to the site by truck and trailer. A steel derrick was set up alongside the north pier and with its 90-foot lattice steel boom and a steam hoist set twelve of the long girders in 8 hours. Three trailers and trucks were used for hauling and the girders were spotted on the temporary timber bridge alongside the new structure. The sequence of setting was to set all the girders in the center span and then the north span before the derrick was moved to the south pier. In the speedy setting there was one fly in the ointment, for four of the girders were delivered oriented improperly, necessitating taking the girders off the trailers, turning them and then picking them up again for setting. A spanner rig was used for handling the girders.

Floor Forms

The floor forms were made in panels 17 feet 4 inches long by 6 feet 6 inches wide, using 1 x 8-inch planed lumber with butt joints. Cleats or studs for the forms were 4 x 4's on 16-inch centers and at each stud a vertical 4 x 4 was used as a brace or column to the lower flange of the girder with a wedge for tightening. Another 4 x 4 run down the center of the studs was used as a brace for nailing the diagonal 2 x 6's carried to the bottom flange every 52 inches, the spacing of the diaphragms.

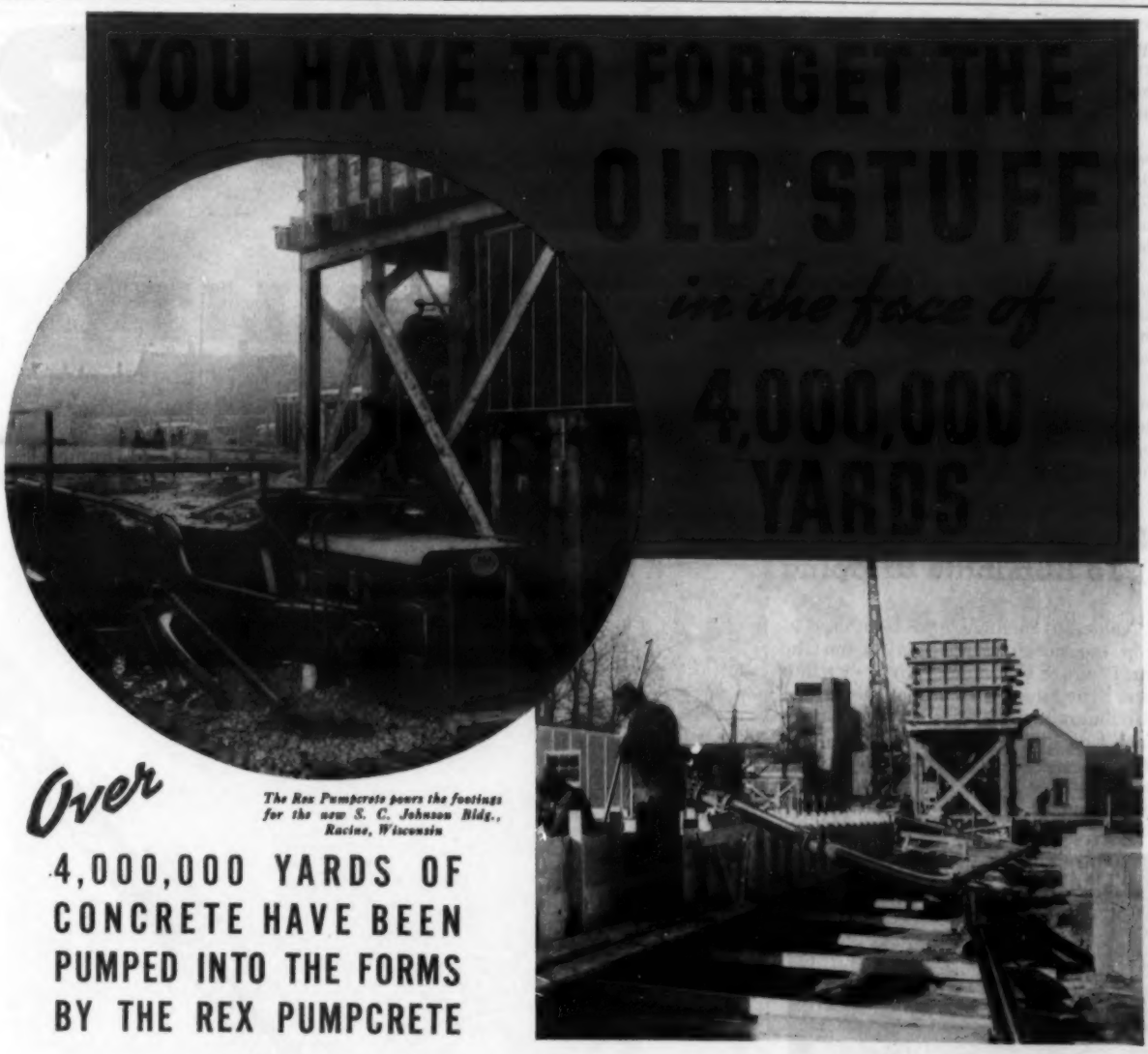
The sidewalk forms cantilevered from the outside girder were supported by 4 x 8's clamped to the outside girder and with a stirrup to hold it. The cantilevered portion supported the sidewalk

(Continued on page 21)



C. & E. M. Photo

Setting Up a Lateral Runway for the Concrete Buggies



Over

The Rex Pumpcrete pours the footings for the new S. C. Johnson Bldg., Racine, Wisconsin

4,000,000 YARDS OF CONCRETE HAVE BEEN PUMPED INTO THE FORMS BY THE REX PUMPCRETE

From New York's Triborough to San Francisco's Oakland Bay Bridge;
from Los Angeles' Metropolitan Water District to New York's Manhattan Tunnels;
from Minneapolis' Interceptor Sewers to New Orleans' Huey Long Bridge;
from Chicago's Outer Drive to Atpeco, Texas, Oil Refineries;
from Boulder Dam to Brakhamstead Dam;
they found that it paid to forget the old stuff in favor of the Rex Pumpcrete.
In 1937, before you buy, before you bid, investigate the up-to-date methods of pumping concrete.

CHAIN BELT COMPANY, 1666 W. Bruce St., Milwaukee, Wis.

REX REX UP-TO-DATE METHODS OF HANDLING CONCRETE

CONCRETE BY PIPE LINE-WITH THE REX PUMPCRETE

CHAIN BELT COMPANY *of Milwaukee*

The New Robins Elliptical-Stroke Vibrating Screen

New Vibrating Screen Of Increased Capacity

The new Robins horizontal elliptical-stroke screen, which both sizes and feeds material on a horizontal plane through either one, two or three decks, differs from the previous Gyrex and Vibrex screens mde by Robins Conveying Belt Co., 15 Park Row, New York City, in having an elliptical motion instead of the circle-throw motion which is almost universal among mechanically-operated screens today. It also differs from other horizontal screens in having this elliptical uniform motion instead of an inclined straight-line motion.

The elliptical motion operates in a counter-flow direction which causes the material on the screen to turn over as it travels, thus assuring an opportunity for all undersize pieces to pass through the mesh.

The vibrator which imparts the elliptical motion to the entire screen is of simple mechanical construction, totally enclosed and provided with anti-friction bearings.

One of these screens, in the 4 x 8½-foot size, operated by a 3-hp motor, has easily sized broken stone at over 200 tons per hour, making a separation at the 1-inch size.

New Spray Bar Design To Eliminate Dripping

Numerous methods have been used to stop the unsightly dripping from the spray bars of bituminous power distributors. The latest, a feature of the Brokol distributor manufactured by the Budde Tank Co., Inc., 94-96 Madison St., Newark, N. J., is called the Brokol dripless spray bar and works in connection with its "automatic back suction." The heads or center bars are so constructed that all the material left in the bars after cut-off is instantly sucked into a sump from where it is taken up by the automatic back suction and returned to the tank. The nozzles instead of being in the bottom of the spray bar are in an offset along the top of the bar so that no material remains above the nozzles.

Other features of the Brokol distributor are the mounting of the engine immediately behind the cab where it is less exposed to the clogging fumes of the bituminous material. The engine is mounted on a telescopic frame and can be pulled out of its protected position by one man in a minute's time without the aid of any tools, thus making all parts easily accessible for maintenance and repairs.

The new burners which are mounted directly on the flues can be easily removed by loosening two thumb screws and are almost flush with the rear head of the tank. A positive cut-off valve at the burner nozzle makes it possible to stop the heat instantly. A constant pressure at the burners is maintained through a simple device without the use of clutches or valves.

Literature describing Brokol distributors may be secured from the manufacturer by mentioning this magazine.

ROME DESIGN
MATERIALS
WORKMANSHIP

ROME DESIGN has been copied but never equaled.
ROME MATERIALS are selected to conform to definite specifications.
ROME WORKMANSHIP is first-class in every detail.
DEALERS in principal cities.

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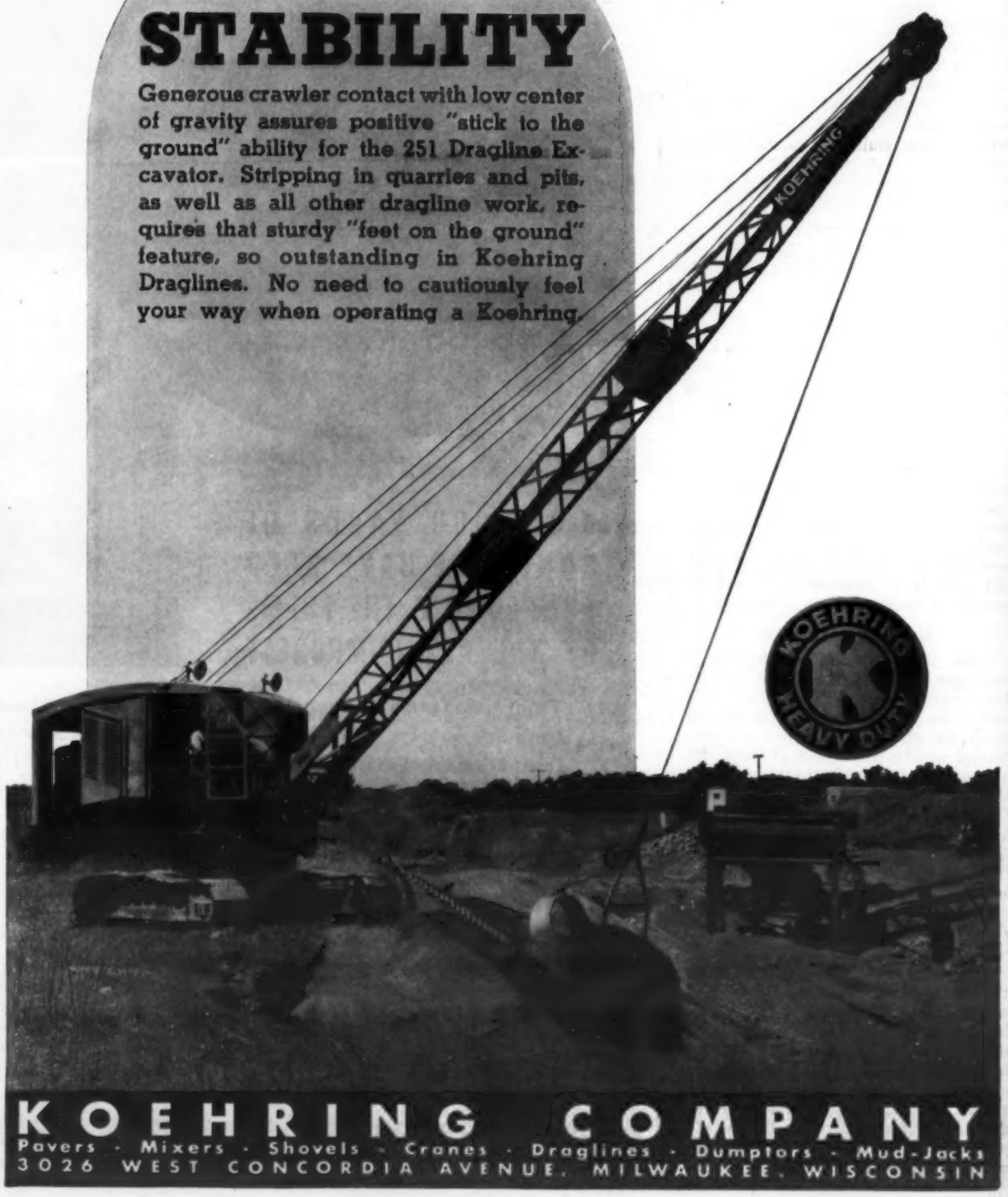
ROME, NEW YORK
Manufacturers of "High Lift" Graders, Auto Mowers, Motor Graders and Snow Plows

KOEHRING

STABILITY

Generous crawler contact with low center of gravity assures positive "stick to the ground" ability for the 251 Dragline Excavator. Stripping in quarries and pits, as well as all other dragline work, requires that sturdy "feet on the ground" feature, so outstanding in Koehring Draglines. No need to cautiously feel your way when operating a Koehring.



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- 18 Ft. Movable Forms Give Smoothness of Concrete,
- 50% More Traction,
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- Adjustable 9 to 14 Ft. Widths,
- Blends Perfect Joints,
- Capacity to 1000 Tons a Day,
- Lays Hot or Cold Bituminous, Stone or Macadam,
- Pug Mill Spreader,
- Less Hand Finishing,
- Automotive Construction,

Write for New Catalog, Prices.

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701 Dublin Ave., Columbus, Ohio

JAEGER

Good Machines Make Good Workmen

Give County Highway Crews Modern Equipment and They Will Give You Good Roads, Says County Superintendent

SINCE 1932, it has been possible greatly to improve the county highway system of Dona Ana County, N. M., and at the same time reduce the annual budget from $65,000 to $28,000, according to Dan W. Williams, County Road Superintendent. This has been accomplished through the development of a trained, loyal county highway organization and the use of power equipment.

Dona Ana County, located in the southern part of the state, is an irrigated valley, securing water from Elephant Butte Dam which is 70 miles north of Las Cruces on the Rio Grande. As a result, all the ditches to furnish water to the farms and the drain canals cross the roads, presenting a special problem in the construction and maintenance of the county highway system.

The present county road superintendent took office in 1932, at which time the department's equipment consisted of some old crawler tractors and an old pull grader which required two men to operate it. The first step was to convince the County Commissioners of the necessity for purchasing some new up-to-date equipment. When they were finally persuaded to authorize the purchase of a Caterpillar Auto-Patrol grader, they were severely criticized by the populace at large for such a large expenditure, but in six months' time, the taxpayers were offering congratulations on the results achieved with this machine.

The second year the budget was cut to $40,000 and the following year it was further reduced to $28,000. However today the department owns two Auto Patrols and one Austin-Western grader, all of which are power and hydraulic-control one-man machines. One of the old Cletrac tractors is still in use.

Organization

Up to 1932, the matter of hiring men for road superintendents was entirely a political affair, regardless of their suitability for that type of work. When the present road superintendent took charge of the department, he persuaded the County Commissioners to allow him to do the hiring and firing, agreeing to give party men the preference, all other things being equal.

County Superintendent Williams believes it necessary to the effective functioning of the department to build up an organization which will be loyal and take an interest in the work. Good operators are scarce and it was evident that the high cost of much of the work done was due to the fact that many of the men in the department were there because of their political affiliations rather than because of their ability to do their jobs well.

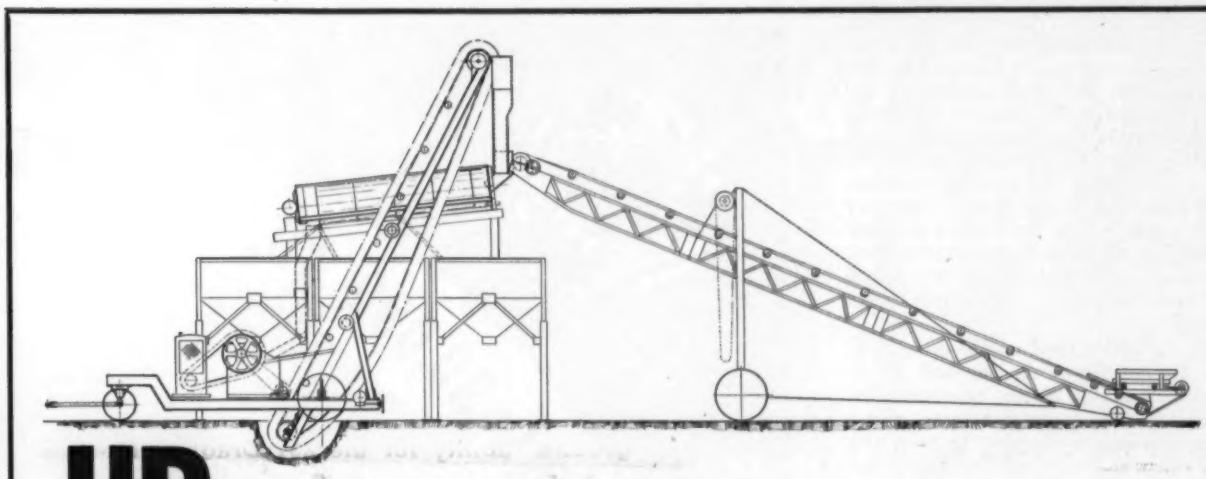
Now that a loyal, efficient organization has been built up, road foremen and county commissioners from neighboring counties visit Dona Ana County to inspect its roads and equipment. Mr. Williams attributes much of his success as a road superintendent to his loyal, upright employees and suggests that the best way to keep men loyal is to furnish them with good equipment, so that they may be proud of their work.

Night Work on the H. N. Rodgers & Son Levee Contract Near Greenville, Miss., Showing a Caterpillar RD-8 and One of the New LaPlant-Choate 18-Yard Hydraulically-Operated Wagons

Gravel Surfacing

There are about 400 miles of gravel

(Continued on page 41)



UP GO PROFITS WHEN YOUR OPERATING COSTS GO DOWN

Use a GOOD ROADS semi-portable plant to get out your aggregate on the job, and watch your operating costs go down. Hauling and handling costs will be greatly reduced and a positive control of materials assured.

CRUSHING PLANTS MADE TO ORDER

Every plant operator has his own particular needs and his own ideas about plant arrangement and performance. No standard plant can meet all requirements and give every user maximum efficiency.

For this reason GOOD ROADS makes a specialty of designing and building plants to meet the requirements of each purchaser, at no extra cost. Designed to meet individual specifications, these plants are arrangements of well-known GOOD ROADS units.

Typical of such made-to-order plants is the arrangement shown in the drawing above. It is designed to handle either rock or gravel, and consists of an all-steel lattice type GOOD ROADS portable belt conveyor with reciprocating feeder; gear-driven GOOD ROADS revolving screen; three GOOD ROADS CHAMPION all-steel, jack-leg bins; and a GOOD ROADS CHAMPION No. 1030 Roller Bearing Crusher, mounted with folding type steel frame bucket elevator and gasoline power unit.

GOOD ROADS can also supply all-wood and steel frame bins; various types of elevators and conveyors; vibrating screens; chutes; hoppers, grizzlies and feeders; washing and scrubbing equipment; and a complete line of rock, sand, and gravel plant machinery. Write for information.

Good Roads MACHINERY

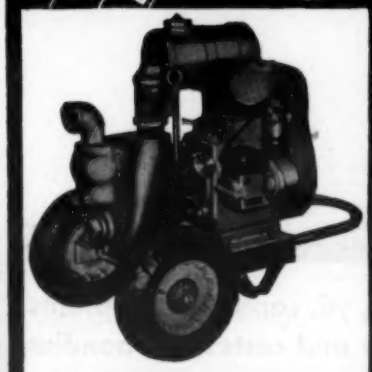
GOOD ROADS MACHINERY CORPORATION

KENNETT SQUARE, PENNSYLVANIA

SIMPLE RUGGED DEPENDABLE

STERLING QUALITY

SELF PRIMING PUMPS

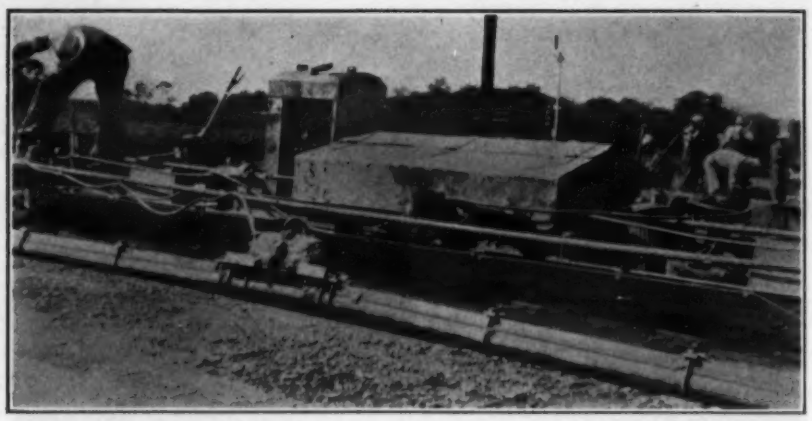


EFFICIENT DESIGN

Sterling's Patented Construction permits use of efficiently designed impellers and pump cases. Compare the performance and efficiency obtained with the Sterling three blade streamlined open trash type impeller with those using impellers with many narrow blades and those with special volutes—made necessary by inferior self-priming design. For efficient self-priming design insist on Sterling.

Ask For Literature Today

Sterling MACHINERY CORPORATION



The Jackson Vibrating Paving Tube in Use on a Concrete Road

New Vibrating Tube Used Ahead of Finisher

The use of a 4-inch steel pipe spanning the width of newly-poured concrete pavement to within 3 inches of the side forms and on which is mounted a powerful electric vibratory motor has effected some interesting results in recent concrete paving in Kansas. The tube is carried by the finishing machine and is submerged in the concrete just ahead of the screed. The tube is raised or lowered by operating a lever convenient to the man running the finishing machine. It is interesting to note that the vibratory tube works within the roll of concrete carried by the reciprocating screed. With it concrete with a slump of only 1 inch has been handled very effectively by the screed.

M. E. Gillioz used one of these Jackson Paving Tubes on one half of an 8-mile stretch of 20-foot concrete pavement in Chase County, Kansas, giving an opportunity to compare the work with and without the tube. The aggregates consisted of a sand-gravel mixed material to which was added 30 per cent of coarse gravel. Without the vibrating tube the cement factor required for this work ran from 1.52 to 1.55. After starting to use the tube it was possible to reduce the cement factor to approximately 1.42, saving from one-tenth to one-eighth barrel of cement per cubic yard of concrete.

In addition to the saving of cement it was found possible to eliminate two laborers who had been spading against the form, because the vibrating tube did this work and practically eliminated all honeycomb along the edges of the pavement. The tube was found particularly helpful during cool weather as it was possible to run a much drier mix and thereby complete the finishing operation earlier in the evening. The vibrating tube was also helpful to the finishing machine as the concrete was in a much more plastic condition after the tube had gone over the concrete. Thus the finishing machine was able to go ahead at a more rapid rate and with less effort. The Jackson Paving Tube is made by the Electric Tamper & Equipment Co., Ludington, Mich. Power for the vibration unit, which is mounted at the midpoint of the tube, is provided by a portable gas-electric generating unit carried on the finishing machine.

Lining a Diversion Flume In Northern Algeria

A concrete paving 20 inches thick laid in blocks about 34 feet square is being laid as a lining for a diversion flume on the Bou-Hanifia project in Northern Algeria, Africa. This flume is designed to carry water at about 50 miles per hour, requiring unusual smoothness of the finished concrete surfaces.

A Blaw-Knox finishing machine of the double-screed type designed primarily for road work was used to screed and finish the flume lining. This is believed to be the first time that one of these largest screed machines has been used in the construction of so large a flume. The finishing machine was assembled and operated by natives who had never seen equipment of this kind before. It is adjustable in width from 32 to 34 feet and is equipped with a gasoline engine designed for efficient operation at the high altitudes encountered in the mountainous country surrounding the project.

A Trailer for Every Heavy Duty Requirement

- Fully Reversible—Pulls from either end
- Brakes on all wheels controlled from either end
- Pneumatic Tires
  Meets all road width restrictions

Trailers of all types and up to any capacity.

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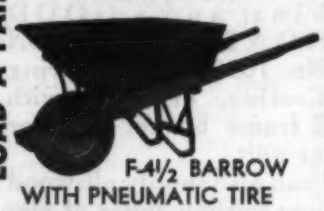
C. R. JAHN CO., LaCrosse, Wis.

Handy Barrows on the Elevator Hoist at ONE Time

LOAD A PAIR of These



F-4½ BARROW
WITH PNEUMATIC TIRE

Easy loading or dumping; correct width for hoisting 2 barrows at once; deep tray for very wet concrete or mortar. Never-slip type axle, 16" wheel, with ball bearings; hardwood handles; reinforced frame; strong channel-iron legs. Capacity 4½ cu. ft. (dry measure). A money-saver. WRITE for bulletin L-12, and costs.

INSIST UPON LANSING PNEUMATIC-TIRED BARROWS

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BOSTON KANSAS CITY MINNEAPOLIS
SAN FRANCISCO

THEW CENTER DRIVE

3/4 YD. LORAIN-40 EARNS 30,000 YD. ESTIMATE IN 30 DAYS

THE RECORD

Unit: ¼ yd. Lorain-40.
Owner: Gordon Construction Co., Denver, Colo.
Job: 130,000 yd. highway grading job in Big Thompson Canyon, Estes Park.
Material: Shot rock.
Height of working face: 12 ft.
Degrees of swing: 50°.
Hours worked per day: 12 hours.
Aver. yardage per day: 1000 yds.*
Disposal of material: To trucks on 800 ft. haul.

*"From Nov. 25th to Dec. 25th, our estimate was 30,000 yds., working 12 hrs. daily."

LORAINS • 2 to 3/8 yd.

The Lorain-40 offers you ¾ yd. capacity and profits at practically ½ yd. weight and costs . . . It handles an honest ¾ yd. dipper at generous ranges; weighs only 33,000 lbs.—yet it has the power, speed and endurance to turn out records like these, because it is built on the new principle that Capacities depend on Stability and Strength, not Weight.

THE UNIVERSAL CRANE CO., LORAIN, OHIO

LORAINS

Texas Highway Dept. Builds Roadside parks

(Continued from page 2)

brick fireplaces furnished with iron grates to simplify tourist cooking. Advantage has been taken of shade trees for the placing of picnic tables and where shade trees are unknown as features of the landscape the highway department erects various types of rustic shelters.

These roadside parks are becoming more popular with the motoring public as their locations become better known and it is hoped that ultimately there will be enough sites available along the more heavily-traveled highways to place a park at least every 10 miles.

Roadside Improvement Program

In company with the park building program the state is pushing ahead with a roadside improvement program. Although primarily intended as a measure for increasing the safety of driving on the highways, carrying out these plans has done much to increase the beauty of the countryside. In the sandy wastes of western Texas, the results of the past three years in roadside improvement have been most marked where plantings of the yucca and ocatilla have made for safety as well as beauty. Individual plants, set out to call attention to sections of guard rails, culverts or warning and information signs, do much to relieve the monotony of desert road.

Along the main highways of western Texas, plantings of cactus call the motorist's attention to outside curves while at hill tops the plantings bring out clearly the alignment of the road as a direct aid to night driving. All of these plants along the highways are carefully tended by the regular maintenance crews. Watering is carried on at frequent intervals so that the plants or trees set out will have the best growing conditions possible.

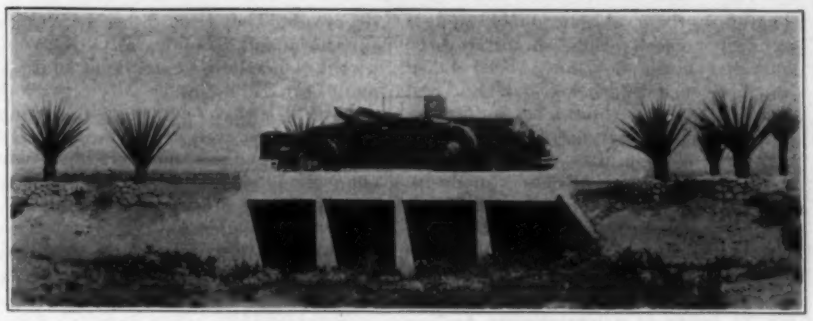
With its program of establishing free roadside parks and its roadside improvement plans, the Texas State Highway Department is making a distinctly pioneering effort to provide safer and more complete enjoyment for both citizens and the visitor traveling within or through the state. And like every other effort of the pioneer, it points to many new obligations of the state in providing protection for both the physical property of the road and roadway as well as the safety necessary for the fullest use and enjoyment of the highway system.

Air-Cooled Engine Production Increased

Doman-Marks Engine Co., Inc., Syracuse, N. Y., has launched expanded production of its air-cooled heavy-duty engines for motor trucks and industrial installations. This follows more than a year of development work after the foundation of the company in late 1933, and about a year of initial output that has extended to a variety of power applications. At the present time the engines are in use as replacements in heavy-duty motor trucks, in air compressors and in power units for snowplows.

The current activities in Syracuse are providing for a complete tooling up for manufacture in increased quantity within the Doman-Marks plant for parts formerly handled on contract with outside sources. The result of this move has quadrupled local employment in the plant.

Among the engineering projects now under way is the manufacture of three initial models of a new light-weight low-priced car for interests outside of Syracuse which will involve the use of a 4-cylinder, opposed-type air-cooled engine.



Roadside Planting in Texas Does Double Duty in Beautifying the Highways and Calling Motorists' Attention to Culverts

The success of Doman-Marks engines as replacement units in truck fleets has been interesting. The economy of the installation is based on freedom from trouble through air-cooling, the elimination of anti-freeze expense, and a reduction in gasoline consumption showing a saving of as much as 1.34 cents per mile on gasoline and oil alone on a heavy hauling truck fleet.

E. S. Marks, Vice President of the Doman-Marks Engine Co., was Chief Engineer of the Franklin car for many years and Carl P. Doman, another Vice President, was research engineer for approximately an equal time. Lewis E. Pierson, Jr., is President and Wallace Benedict is Sales Manager.

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CUT 90%
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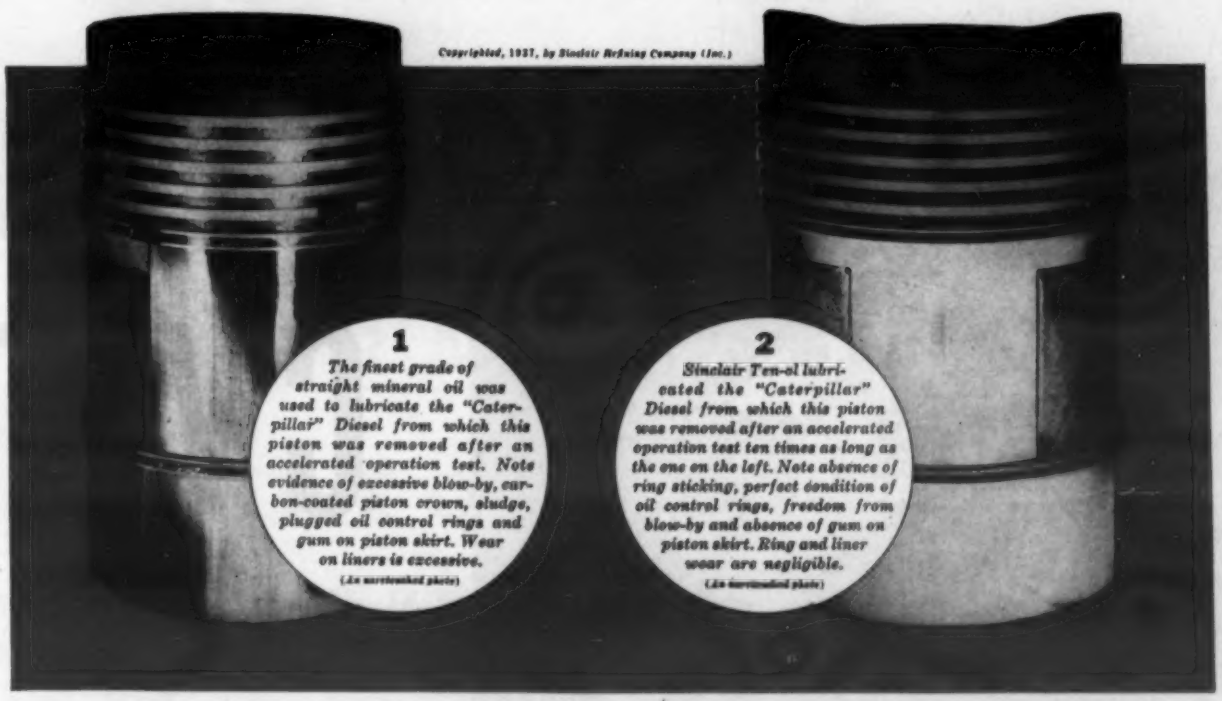
IN heavy duty, high-output laboratory tests, "Caterpillar" Diesel engines were operated 2000 hours lubricated with high grade straight mineral oil, and also with Sinclair Ten-ol. After the tests, measurements revealed that the wear on cylinder liners of the engines lubricated with Sinclair Ten-ol was less than 1/10 the liner wear in engines lubricated with high grade straight mineral oil.

That is just one of the newly developed facts which show that your "Caterpillar" Diesel overhaul cost will be 90% less if you use Sinclair Ten-ol. Ten-ol is an alloyed lubricant recently developed for "Caterpillar" Diesels by Sinclair Refining Company. It is recommended as a "new outstanding Diesel engine lubricant" by the Caterpillar Tractor Company.

Order Sinclair Ten-ol, Sinclair Diesel fuel and other Sinclair products from your local Sinclair office or write to Sinclair Refining Company (Inc.), 630 Fifth Avenue, New York City.


Copyrighted, 1937, by Sinclair Refining Company (Inc.)
1
The finest grade of straight mineral oil was used to lubricate the "Caterpillar" Diesel from which this piston was removed after an accelerated operation test. Note evidence of excessive blow-by, carbon-coated piston crown, sludge, plugged oil control rings and gum on piston skirt. Wear on liners is excessive.
(An unretouched photo)
2
Sinclair Ten-ol lubricated the "Caterpillar" Diesel from which this piston was removed after an accelerated operation test ten times as long as the one on the left. Note absence of ring sticking, perfect condition of oil control rings, freedom from blow-by and absence of gum on piston skirt. Ring and liner wear are negligible.
(An unretouched photo)

Rendering First Aid To Water-Logged Tools

Suggestions to the users of electric tools which may have been under water during the recent floods have been made by John S. Hand, Service Manager, Black & Decker Mfg. Co., Towson, Md. Submersion has probably ruined the insulation in the tools as well as rendering the fibre parts unfit for use. Grease has become diluted and dirty and all parts are covered with silt and mud. Therefore these electric tools, motors or switch mechanisms should not be operated until they have been taken down, cleaned, and baked out. For best results, the tools should be sent to the nearest factory service branch for a complete overhauling.

However, for the owners who desire to service the tools themselves, the following procedure is suggested. Completely disassemble the tool, to get to all parts. The armature and field should be put into an electric oven and baked for 24 hours at a temperature of 275 degrees F. They should then be checked for shorts and grounds. If O. K., apply a coat of insulating compound and bake again for 12 hours at 275 degrees F. All fibre switch and brush riggings should be replaced. Most switches will have to be replaced and all taped wire connections should be cleaned and re-taped. Clean all ventilating holes.

Wash all grease from the gears, housing and bearings, using a suitable fluid. Repack with new lubricant, using a good grade of medium cup grease, such as Non-Fluid Oil A-3 or its equal. Clean the rust and dirt from all parts.

These instructions apply to all electric grinders both portable and bench, sanders, polishers, drills, screw drivers, hammers, saws and most types of motor-driven electric tools.

Of the extensive network of national automotive highways under construction in Germany at the end of October, 1936, the total length in actual operation was 621 miles, and there were about 345 miles under construction.

FROM *Start to Finish*

LEANING FRONT WHEELS FOR DITCHING. → The "Caterpillar" Diesel Auto Patrol, equipped with leaning front wheels, cuts and cleans ditches. Tandem low-pressure tires on the drive wheels supply extra traction to turn all its power into work.

LESS THAN 7 CENTS AN HOUR FOR FUEL. This "Caterpillar" Diesel Auto Patrol is rebuilding a military road between Seattle and Tacoma, Wash.—using only 1½ gallons of 4½-cent Diesel fuel per hour. ↓

CATERP

REG. U.S. PAT. OFF.

Road Bridge Check-Up Ordered in Minnesota

A check of every highway bridge on every trunk highway in Minnesota by regular crews, to paint, repair and recommend heavier improvements has been ordered by the Minnesota Highway Department in an order by M. J. Hoffman, State Bridge Engineer, to all district maintenance engineers.

These crews will make temporary repairs at least twice annually, correcting such items as plugged drains, bent railings, rusty spots on steel, missing bolts and railings, loose nuts on railing bolts, and loose expansion joints. They will also remove dirt and sand from bridge floors and truss members and from bridge seats around roller or rocker bearings, clean out channels under bridges, and cut all brush and trees under or adjacent to bridges, correct excess washing or cutting of banks under bridges and do spot coat painting where necessary.

The crews will report all bridges which should be painted, repaired or widened during the season, note the condition of the steel as to per cent of rusty surfaces, and report bridges that require repairing, strengthening, new floor systems and replacements.

New Booklet on Road Equipment Published

The "Iowa Profit Maker," a new pamphlet issued by the Iowa Manufacturing Co., Cedar Rapids, Iowa, "in the interest of better roads," describes and illustrates the application of Cedar Rapids material handling equipment to the problems of aggregate production for road building and maintenance.

Copies of this pamphlet, as well as catalogs describing in greater detail Cedar Rapids crushers, vibrating screens and the new Iowa Super Straight Line crushing and screening plant, may be secured by interested contractors, state and county highway engineers direct from the Iowa Manufacturing Co. by mentioning this magazine.

SPREADING OIL-MIX. Near Laramie, Wyoming, this "Caterpillar" Diesel Auto Patrol blades oil-mix on a surfacing job. In a short time the road will be ready to turn over to the Maintenance Department which—chances are—will maintain it winter and summer with Diesel Auto Patrol.

STARTING NEW STREET. In Albany, Ga., this "Caterpillar" Diesel Auto Patrol is cutting a new road—using only 1¼ gallons of low-price Diesel fuel an hour. The same machine can dress up and finish the foundation, spread and smooth the mix for the surfacing.

FROM the first cut of the new road to all-year-round maintenance of the finished road, the "Caterpillar" Diesel Auto Patrol is on the job. Tandem low-pressure drive wheels—with the engine over them—provide the traction necessary for constructing ditches and cutting tough material.

This versatile, cost-cutting Auto Patrol's jobs today include construction, cutting ditches, spreading oil-mix, scarifying, reshaping and general maintenance work—and that versatility is one of its economies, to be added to its low-cost operation and minimum up-keep expense.

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Salt Water Used For Pile Jetting

Wellpoints Driven in Beach Deliver Water Free of Sand for Jetty at Long Beach, N. Y.

(Photos on page 48)

AN unusual amount of waterfront improvement has been under way at Long Beach, on the ocean shore of Long Island, New York. A $1,730,500 PWA loan and grant made possible three boardwalk and jetty projects. First a boardwalk demolition contract was awarded to A. M. Hazell, Inc., of New York City, for $54,286 for the removal of 8,217 feet of the old concrete boardwalk built in 1909. Work under this contract began in December, 1935, was temporarily halted in April, 1936, for the summer season, was resumed September 10, 1936 and completed in November.

The second contract was for the erection and construction of jetties and wood bulkheads and was awarded to Jesse A. Howland & Sons, Inc., and Edward A. Hoffmeister, Sea Bright, N. J., for $592,308. This work consisted of the construction of 15 stone jetties and 6,800 feet of bulkhead. The jetties extend 600 feet into the Atlantic Ocean and are placed about 800 feet apart. Each jetty is of both wood and stone construction. The shore end for about 300 feet is built of creosoted wood and the remaining 300 feet of stone, with an overlap of stone over timber for an additional 100 feet. The specifications require that 70 per cent of the stone weigh not less than 6,000 pounds each and all other stone must weigh 300 pounds or over. The 15 jetties have required upwards of 90,000 tons of stone.

The third contract was for the construction of the new boardwalk and was awarded to the Faircroft Engineering Corp., of Brooklyn, N. Y., for $682,769. The new boardwalk is of wood construction, resting on concrete girders, supported by bents of four concrete piles each. The bents average 17 feet on centers and the piles are 14 inches square and 28 feet long. It will be 11,113 feet long and 50 feet wide, requiring approximately 2,600 piles in 650 bents and 570,000 square feet of Douglas Fir flooring. All of this work was completed in December, 1936.

Jetty and Bulkhead Work

On the Howland contract for the jetties and wood bulkheads, a double line of creosoted wood piles was driven out into the ocean with wales to which 6 x 12-inch planks were bolted as vertical sheeting. Then the stone was unloaded from barges to stone skips on the bay side of the island, the skips set on trucks and run across the island and out on a temporary trestle where a crane picked up the skip and dumped it on either side of the line of sheeted wood piles. The trucks backed out on the trestle to the crane.

All of the piles for both the jetty and the trestle had to be jetted. The contractor had two pumping stations to furnish jetting water. Each station had a Gardner-Denver pressure pump driven by a Caterpillar diesel engine and a Gardner-Denver air compressor powered with a Buda gas engine. A 4-inch water line carrying water at a pressure of 175 pounds for jetting and a 2-inch air line for the air-driven augers for the bolt holes were laid out with a total of about 10,000 feet of pipe from each of the two stations. For the actual jetting, 2-inch pipes reduced to 1-inch openings and 16 feet long were used and as many as 4 or 5 of these pipes were working at one time.

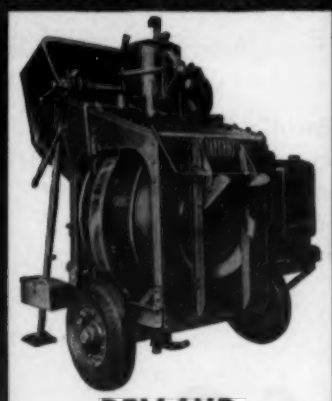
At first a suction line was laid out into the ocean and salt water pumped direct to the jetting line but the sand mixed with the water cut the jetting pumps badly. In order to eliminate this abrasive sand, two systems of Griffin wellpoints were set up, one for each station. Each wellpoint system consisted of 20 points 2½ inches in diameter and 44 inches long, jetted 10 feet into the sand on alternate sides of a 6-inch diameter header 60 feet long, and spaced 3 feet apart. The lines of wellpoints were spread to increase the drainage area and were set out parallel to the ocean. The first system was located just below high water on the beach but had to be pulled and driven lower down because it pulled air at low tide. Each pump had a capacity of 400 gpm but the system was able to deliver as high as 500 gpm in this fine beach sand, pumping salt water through the standard Griffin wellpoints of all-brass screen construction. No corrosion was evident when the contractor pulled the points to set them further into the ocean.

Jetting Concrete Piles

The jetting of the 2,600 concrete piles for the new boardwalk was done by James A. Horton as subcontractor for

(Continued on page 26)

BUYING A MIXER?



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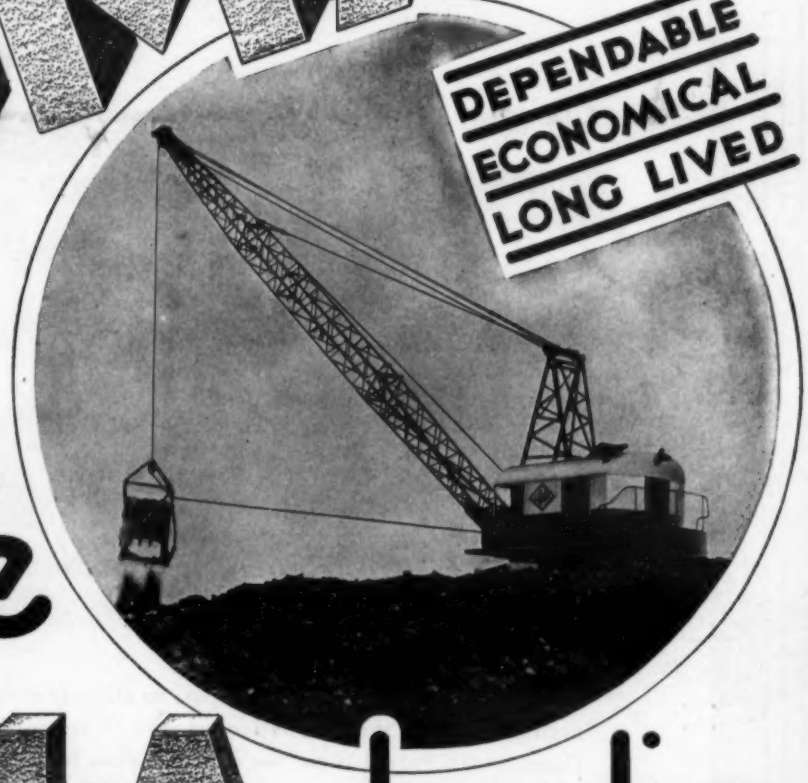

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SHOVELS — DRAGLINES — CRANES — CLAMSHELLS

Epidemic of Road Boils Predicted for Spring

A spring epidemic of road boils, the result of the mild wet weather of the early winter followed by colder weather, has been predicted for New York State, according to a special news dispatch from Albany to the New York *Herald-Tribune*.

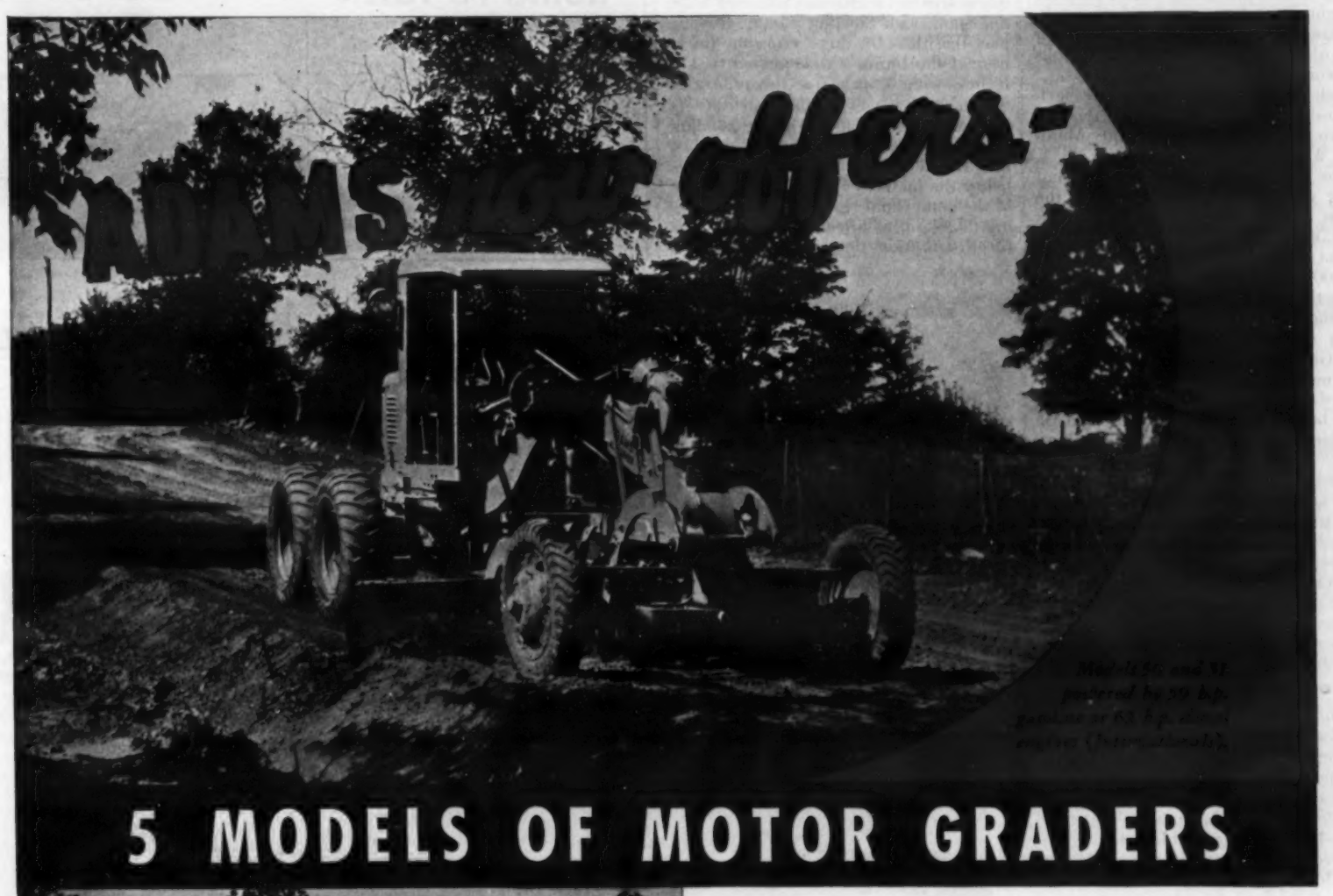
According to David Noonan, Assistant Highway Commissioner, the treatment of frost boils on highways is somewhat similar to remedies applied to the human ailment, lancing and draining being used in both cases to remove the sore spot.

"During the winter, highways are examined and the location of each frost boil is noted," Mr. Noonan said. "As soon as the frost is out of the ground a trench is dug along the side of the road and an ordinary wellpoint is driven under the pavement beneath the swelling. The water under the pavement will then drain away. When the wellpoint is first driven under the pavement, it may be that it is well above the water level. It will then be necessary to take out the wellpoint and drive it in again a little deeper."

How to Weld 29 Metals

This is the title of a new comprehensive 100-page book covering the procedure, conditions and materials for welding modern alloys recently published by the Westinghouse Electric & Mfg. Co. Prepared by Charles H. Jennings, Engineer of Welding Research for Westinghouse, the book also contains specific data for welding all types of joints with varying thicknesses of metal, such as electrode diameter, welding current, speeds, deposition, etc.

Copies of this book may be secured from the Westinghouse Electric & Mfg. Co., Dept. 5-N, East Pittsburgh, Pa. Price: 50 cents.



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Model 101 powered by International T-20 tractor, 59 h.p. gasoline type, shown here with Case LI tractor, 57 h.p.

● No matter what your motor grader needs may be, Adams offers a machine that will suit your purse and purpose exactly. For construction and heavy scarifying, oil-mix and maintenance work there are the new Adams heavy-duty motor graders with 59 and 62 h.p. gasoline and Diesel engines. All average maintenance and road-mix work is easily handled by two popular-priced models powered by 57 and 39 h.p. tractors. For the lighter work there is the new Adams Motor Grader No. 20—a low-priced machine powered by 22½ h.p. tractor, but which turns out a surprising amount of work because of a special rear drive . . . Before buying any motor grader be sure to have your local Adams representative show you the complete Adams line, or write for descriptive catalogs, addressing

J. D. ADAMS COMPANY, Indianapolis, Indiana
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ADAMS *Motor Graders*

Seepage Prevented By Lining Canal

(Continued from page 1)

touched the soil with their magic wand the result is a variety and yield of crops which invariably amaze the visitor. Even a limited water supply brings a profitable growth of cotton, alfalfa, small grains and citrus fruits. But, due to the fact that the life-giving water must be brought long distances in open canals, seepage has always taken about 50 per cent of the volume stored in various reservoirs before it reached the fields.

Such was the case with a large agricultural area west of Glendale, Arizona, irrigated by the Maricopa County Municipal Water Conservation District No. 1, before an extensive program of canal lining and other improvements to the system was completed recently. A loan of $1,350,000 from the RFC made the project possible at this time. About $500,000 of this was spent in strengthening the Lake Pleasant Dam and rebuilding the spillway, the remainder in lining about 33 miles of open canal with Gunite, and on various other improvements to the distribution system. The old wooden checks, siphons and drain boxes were replaced with modern structures of reinforced concrete or metal. Several hundred take-out pipes of Armco corrugated metal, ranging in size from 21 to 48 inches, and in length from 10 to 22 feet, with standard Calco headgates, were installed, and equipped with concrete head and wing walls. All necessary excavating was done by District forces, with teams and Mormon scrapers, supplemented by a Caterpillar Thirty with a Tumblebug, and an Austin No. 8 grader.

Contract Work

Lining of the canal was expedited by the effective line-up of equipment which was employed by the contractor, Vinson & Pringle, of Phoenix. After the slopes and bottom of the canal were finished by hand and the reinforcing, consisting of 4 x 4-inch Clinton welded mesh wire, stretched in place with blocks and tackle and held down by wooden pins, the earth was well sprinkled. The cement was then applied with a machine made by the Cement Gun Co. This was mounted on the rear of a crawler wagon, from which pre-mixed sand and cement was shoveled to the machine. The crawler was pulled just behind an Ingersoll-Rand portable compressor, which in turn was pulled by a 30-hp Bates Mule. Water was supplied by a 1,250-gallon tank on wheels, equipped with a Myers pump, driven by a Cushman engine. The tank was moved up with the Mule as work progressed.

Water was hauled to the job in a 600-gallon tank truck. Sand was obtained at the nearest available points and mixed with the cement in a Jaeger 10-S tilting mixer. Three Chevrolet 3-yard trucks were used to haul the mix to the job, covered with canvas to prevent blowing. As the lining dried behind the machine, it was swept off and a Warmac asphaltic coating was applied with air pressure furnished by a Kellogg compressor, driven by a Novo engine.

On much of the canal approximately 1 inch of Gunite was used, increasing the thickness to 2 inches at the top of the slope, where rails were laid. Many drops in the canal were replaced by chutes, increasing the Gunite thickness to from 1½ to 2 inches. On the upper portion of the canal approximately 100,000 square feet of fills were made, using a Link-Belt dragline and an Austin Badger. Two of the fills were cast direct, the others required short hauls with dump trucks. Water was obtained from the canal, with Sterling pumps, to compact the fills. On this section the thickness of the lining was increased to 1½ inches, with 3 inches at the top rails.

The canal ranges in size from 700 second-feet capacity at the intake heading to 150 second-feet capacity at the last lateral take-out which is about 32 miles below the intake. The reduction in size of the main canal results from water being taken out at fifteen lateral headings for distribution through 120 miles of laterals and sub-laterals. The side slopes of the canal vary from 1¼ to 1½:1. This lining program has reduced the seepage losses from about 50 per cent to approximately 15 per cent of the water turned into the canal.

Personnel

W. W. Lane is Chief Engineer for the District, and R. V. Leeson is his assistant in direct charge of the improvements.

Witherow Heads Blaw-Knox

William P. Witherow has been elected President of the Blaw-Knox Co., Pittsburgh, Pa., to succeed Frank Cordes, who was elected Chairman of the Board. Mr. Witherow was formerly Vice President of Republic Steel Corp. Chester H. Lehman, Vice President, was elected Vice Chairman of the Board and Executive Vice President.

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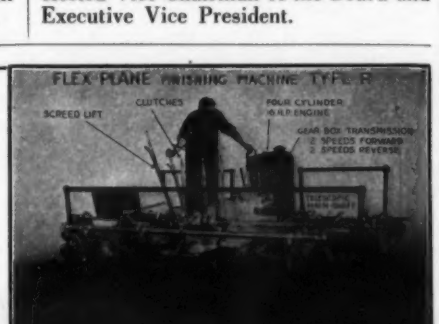

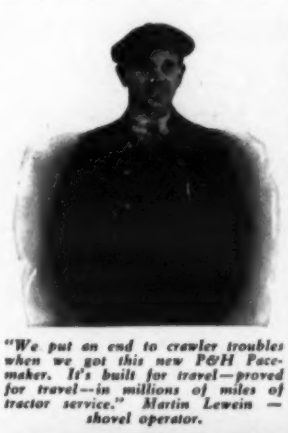

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● The tractor-type crawlers on the P&H Pacemaker are always kept at proper tension by these compensator springs. There's no slack in the crawler track—none of that jerkiness to cause damage. At the same time, there's ample shock-absorbing action in the springs themselves to protect the crawlers against distortion or breakage. These compensator springs automatically adjust the crawler track for proper action on long or short hauls, in sand and gravel or knee deep in muck. Crawler troubles are a thing of the past on these P&H Pacemakers—one of the features that make them faster on the job.

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Culvert Prevents Scour of Road

Unusual Installation Method Tried on L. R. Allison Job near New Laguna on U. S. 66 in Western New Mexico

SOIL erosion is a most important topic in the discussions of state highway engineers in the southwest. Each group tries to find a new method that will permit drainage of the explosive, though scant, rainfalls without damage to highway structures. L. R. Allison of Albuquerque had the contract for some new highway between Albuquerque and Gallup, New Mexico, this past summer and in the vicinity of New Laguna there was a new type of culvert installation that is particularly worthy of description.

The installation was of 70 feet of 36-inch Armco corrugated culvert pipe of 12-gage metal carrying 32 feet of fill. The length of pipe under the fill was only 24 feet and was extended 46 feet beyond the edge of the road, as the ground had already eroded to a depth of 10 feet from the water running through the culvert during the very infrequent storms. Measures to stop the washing of the soil had proved inadequate and had made use of the usual dumping of ¼-cubic foot stone in the arroyo beneath the old culvert pipe. The erosion had continued until there was a natural bridge of several feet span close to the road and the wash was undercutting the right-of-way.

How It Was Done

It is one thing to extend a 36-inch culvert 46 feet beyond the roadway and still another to support it successfully. The first method considered was to use a concrete pedestal but the waters would soon cut under the footing and upset the entire structure. Then a new type of support was developed, making use of materials costing a total of $3.00. Old 56-pound railroad rail could be purchased for $1 each and old 1-inch steel cable for $1 for 35 to 40 feet.

The rails were driven back from the arroyo in solid ground at angles of 45 degrees with a vertical plane on the center line of the culvert and then the culvert pipe supported on the proper grade at about 4 feet from the end by resting it on the 1-inch cable securely fastened to the two rails at the proper height. The slight vibration of the water flowing through the culvert is expected to distribute the flow over a slightly larger area and prevent wash at that point to the same degree as when the culvert is firmly anchored.

This method of installation further saves the cost of a downstream headwall, as only an upstream headwall is required. This method was developed

C. & E. M. Photo

The 36-Inch Armco Culvert Before Extension to 46 Feet Beyond the Roadway

by E. L. Stockton, Assistant District Engineer in charge of construction, with Gordon Sumner, District Engineer, District 3, New Mexico State Highway Department, at Albuquerque, N. M.

Improved Pitch Filler For Paving Blocks

An improved pitch filler for brick, granite blocks and similar pavements has been developed by the Barrett Co., 40 Rector St., New York City. Several years have been devoted to experimental work, and test sections of highway have been installed and observed under varying traffic and climatic conditions.

The new pitch filler has all of the advantages of the old pitch filler in that it does not require excessive heating, adheres to the blocks, fills the joints thoroughly, is an effective waterproofing medium and has a long life under service conditions. In addition, the new filler is less susceptible to temperature changes, is stable in hot weather and is not brittle in cold weather. It can be removed from the top of the block easily and does not extrude from the joints and again cover the top of the block.

Applying Pitch Filler to Granite Blocks

This new pitch block filler, which will be marketed by the various local branches of the Tarvia Department of the Barrett Co., will be shipped in metal drums containing approximately 50 gallons each. Specifications for the new material have been prepared and will be sent by the company on request.

USE RIGHT BUCKET FOR THE JOB

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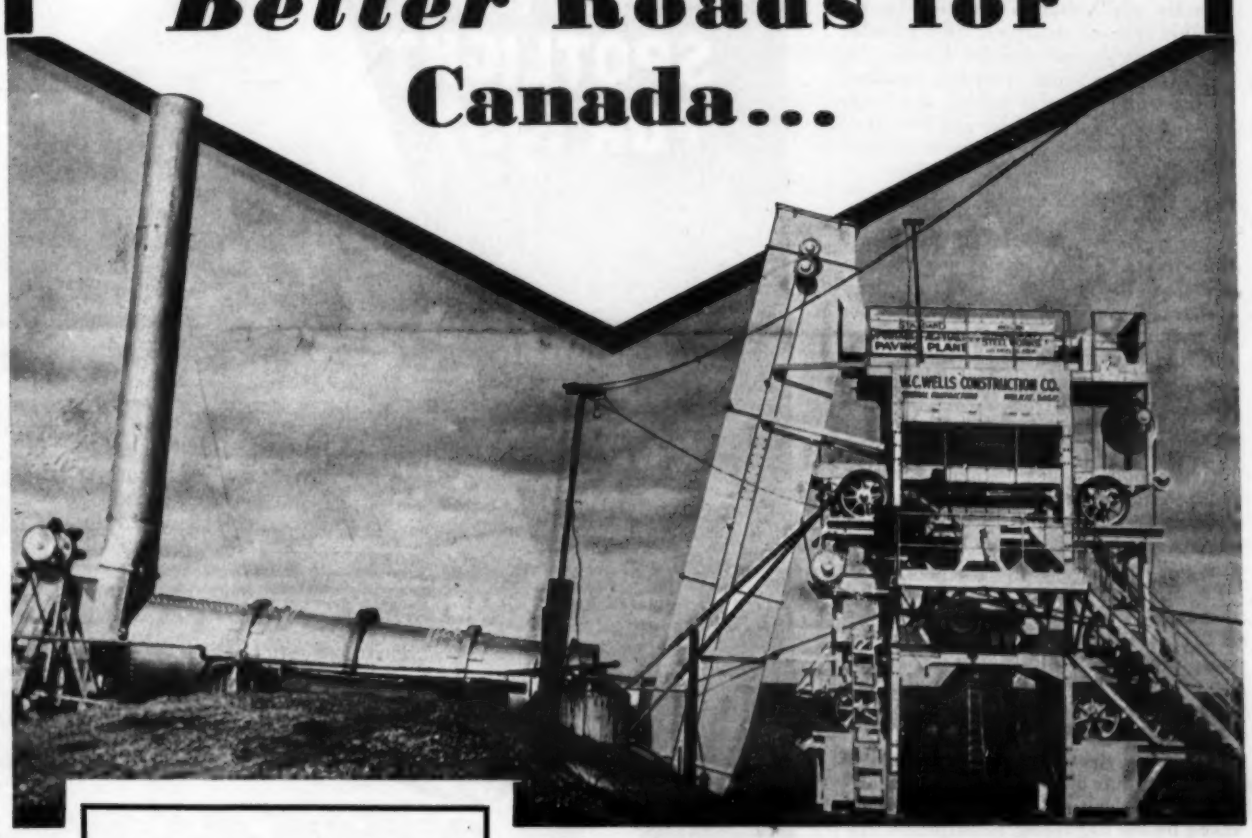
HAYWARD BUCKETS

Better Roads for Canada...



12 *Plants Sold In 1936*

W. C. Wells Construction Company plant at Wilkie, Saskatchewan, erected at Caron, 15 miles west of Moose Jaw. Operation was started September 26th and completed in 1936, furnishing 37,000 tons of plant mix.

Another California construction firm, C. O. Sparks and William Ellington of the Mundo Engineering Company, purchased a STANDARD Plant. This was the fifth STANDARD Plant sold in California in 1936 and the twelfth plant built and sold by STANDARD STEEL WORKS in 1936.

More Profit for the Contractor!

Asphalt Paving bids figured with a STANDARD Portable Asphalt Paving Plant invariably receive the award. The reasons are simple enough: First, the STANDARD Plant reduces cost and speeds up operations; second, there is no huge outlay of money and time spent in plant erection.

Pictured is additional conclusive proof of STANDARD's leadership. W. C. Wells Construction Company of Wilkie, Saskatchewan, erected this plant 15 miles west of Moose Jaw...miles off the beaten path. Operation was started September 26th—and completed *in 1936!* It has furnished 37,000 tons of plant mix.

Transportation to this difficult location was no real problem. The STANDARD Plant is *completely* sectionalized for instant truck trailing—rubber tired wheels are standard equipment. Every trailing unit meets highway restrictions as to weight and bulk.

STANDARD STEEL WORKS

5001 Boyle Avenue Los Angeles, California

First Dredge Boom Of Aluminum Alloy

The 240-foot boom on the Sternberg Dredging Co.'s new diesel-electric clamshell dredge is not only the first dredge boom to be constructed largely of aluminum alloys but it is also the longest dredge boom ever built. Light-weight aluminum construction was employed in the outer 150 feet of the boom in order to minimize the tendency of the dredge to list. In the 90-foot section next to the dredge steel was used.

The dredge and boom were designed for canal and levee work in the Atchafalaya River Basin, Louisiana, where marshy conditions prevent the use of draglines. With its 240-foot boom, the dredge has a working radius of 245 feet and in a single swing can move 15 tons of earth a distance of 490 feet. The rated capacity of the Williams heavy-duty dredging bucket is 6 cubic yards but a heaping load of 10 cubic yards can be handled.

Design of Boom

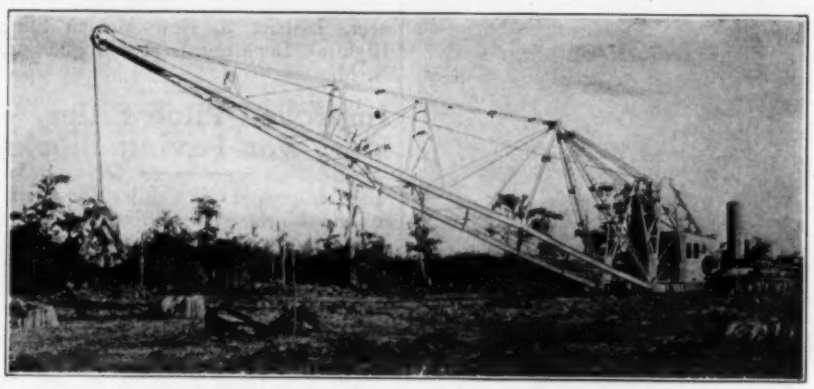
The design of the boom is a radical departure from customary practice but is suited to the use of aluminum and is equally applicable to dragline booms. In this type of structure, each member has a single and definite function to perform. The upper or tension members of the boom are steel cables; the lower or compression members are two plate girders connected by a system of horizontal lacing. The cable members run from the peak end of the girders back to the top of two steel A-frames which come together at a point 48 feet above the girders. The A-frames are pin-connected to the ends of the 90-foot steel-girder section. Between the 150-foot aluminum girders and the cables are three aluminum latticed struts at 37-foot 6-inch intervals. From the top of the A-frames and struts, diagonal cables run downward and forward to the base of the next strut.

The boom, counterweight, hoisting equipment and gantry are carried by the rotating frame which rests on the top of of a welded steel cone. The rotating frame is steadied by guide rollers at the base of the cone and it can be rotated through 180 degrees by means of cables encircling the base. The boom is raised and lowered by cables running from the top of the rotating frame to the top of the A-frames.

Weight Reduction

Since no steel boom of this design and length has ever been built, it is impossible to determine exactly the weight saved by the aluminum construction but it is estimated that the direct saving in the parts where the aluminum is used is about 21,000 pounds. The aluminum section of the boom, including struts but exclusive of sheaves and pins, weighs about 31,780 pounds. Of this amount, 17,580 pounds is aluminum and the balance consists of steel eyebars, rivets, plates, cables, etc. A reduction of 21,000 pounds in the outer 150 feet of the boom is calculated to increase the stability about the center of the rotating cone by 3,610,000 foot-pounds, which is equivalent to 14,750 pounds at the bucket. This saving in weight makes it possible to use a 6 instead of a 4-cubic yard bucket, thus increasing the output in an average 24-hour day 2,000 cubic yards. If the same stability were to be maintained with a conventional boom and 6-cubic yard bucket, the maximum boom length would be about 210 feet.

The aluminum section of the boom was fabricated by the St. Louis Structural Steel Co. and the dredge was built by the St. Louis Shipbuilding & Steel Co.



Sternberg Dredging Co.'s 1,750-Ton Dredge with a 240-Foot Boom of Aluminum Alloy and a Williams 6-Cubic Yard All-Welded Bucket

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VIBRATING ROLLERS
For Concrete Pavements

IMMERSION TYPE VIBRATORS
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Weight 65 lbs., complete

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SEATTLE, U.S.A.

COMPACT—POWERFUL—SAFE
"For use where power is not practical or available"

Manufactured in 2, 5 and 15-Ton Sizes. For capacity comparison, ½" cable used:
2-Ton "Lightweight" ..... 75 ft.
5-Ton "General Utility" ..... 250 ft.
15-Ton Triple-Geared "Special" ..... 1200 ft.
Patent instant gear change and positive internal brake that never fails, and will lock load.

Gear Ratios	Weight	Price
2-Ton 4 & 22 to 1	60 lb.	$50
5-Ton 4 & 24 to 1	110 lb.	$75
15-Ton 4, 19 & 109 to 1	600 lb.	$200

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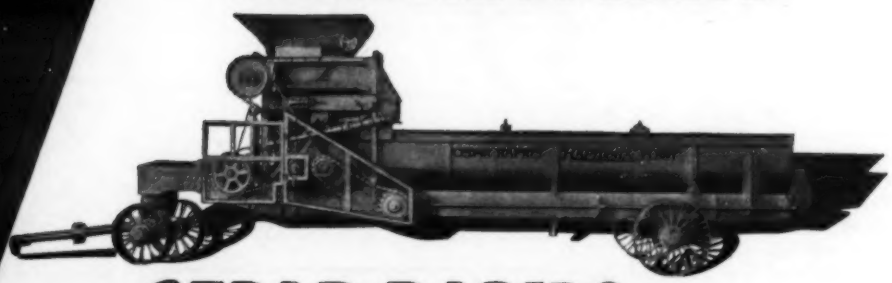
IN THE SPOTLIGHT FOR 1937

CEDAR RAPIDS TRAVELING ROADMIX PLANT



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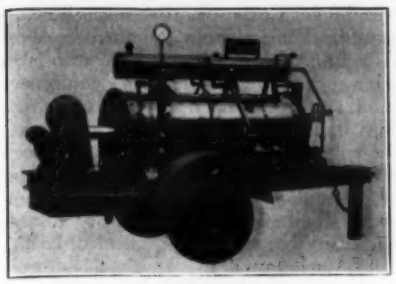

A Cleaver Two-Wheel Trailer with Return Condensate System

An Asphalt-Car Heater Mounted on a Trailer

Cleaver-Brooks Co., Brumder Bldg., Milwaukee, Wis., has developed a one-car heater mounted on a two-wheel trailer that can be hustled around from one asphalt tank car to another to boost the temperatures for quick delivery of the tank contents.

The heater has a 15 to 20-hp down-draft 100-pound working pressure internal combustion boiler and has outside magnesium block insulation covered with steel sheet lagging. The return condensate system includes a large receiver tank fitted with a water glass column, an efficient duplex steam pump equipped with a lubricator and necessary piping and valves. Approximately 50 to 100 gallons of make-up water is required to heat one tank car.

The road oil pump is a steam-driven duplex piston pump mounted on the frame and connected with connections. It has a capacity of approximately 40 gpm of fluid material.

This company makes three sizes of these tank car heaters and two sizes of boosters for heating bituminous materials to higher temperatures and more rapidly than is possible with steam. Literature describing this equipment may be secured direct from the manufacturer by mentioning this magazine.

A One-Man Puller Jack

A lever-operated mechanism, using the simple principles of leverage and working on a ratchet-toothed chain sprocket wheel, has been developed by the Edelblute Mfg. Co., Reynoldsville, Pa. This Anchor Puller-Hoist is easy to operate since all that the one man has to do is to hook the hoist to a secure anchorage, hook the chain to the load and work the handle back and forth, pulling the load in a notch at a time. The hoist is reversible by means of a reverse latch so that as the handle is worked it lowers or slacks off the load a notch at a time.

This device is primarily a pulling outfit for use on horizontal or inclined pulling work, such as occurs a hundred times on every job. Its use as a vertical hoist is merely incidental, to which it can be applied when necessary but it is not intended to compete with the standard type of chain hoists which have their own field of service.

The Puller-Hoist weighs only 29 pounds and the chain 16 pounds. The 1½-ton size has a pulling or hoisting speed ranging from 2 to 4 feet per minute, according to the load. The minimum distance between hooks, that is the narrowest space in which the puller can be used, is 18 inches. It is ruggedly built of malleable iron, forged and alloy steels with drop-forged hooks and high-carbon heat-treated steel chain.

The Anchor Puller-Hoist (Center) Used as a Pulling Jack (Below) and as a Chain Hoist (Above)

Design of Concrete Piles, Manufacture and Driving

The rapid increase in the use of concrete piles has created an urgent demand for information on their design, manufacture and driving. To meet this demand the Portland Cement Association has assembled data from many sources and presented it in an 80-page booklet filled with photographs of well-known pile structures and plants for casting piles.

Since the load capacity of piles is affected by the various properties of the soil and disturbance caused during construction by such operations as pile driving, considerable exploration is necessary as outlined in this booklet. Pile driving formulas are listed followed by a discussion of the load capacity of pile foundations considered as single piles and piles in groups.

The design, manufacture, handling and driving of precast piles, cast-in-place piles and sheet piles occupy three important chapters. The final chapters include a group of specifications covering the manufacture, handling and driving of piles and a bibliography on concrete piles. Copies of this booklet "Concrete Piles" may be secured without cost from the Portland Cement Assn., 33 West Grand Ave., Chicago, Ill.

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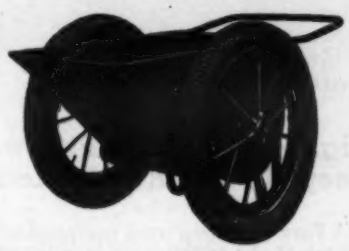
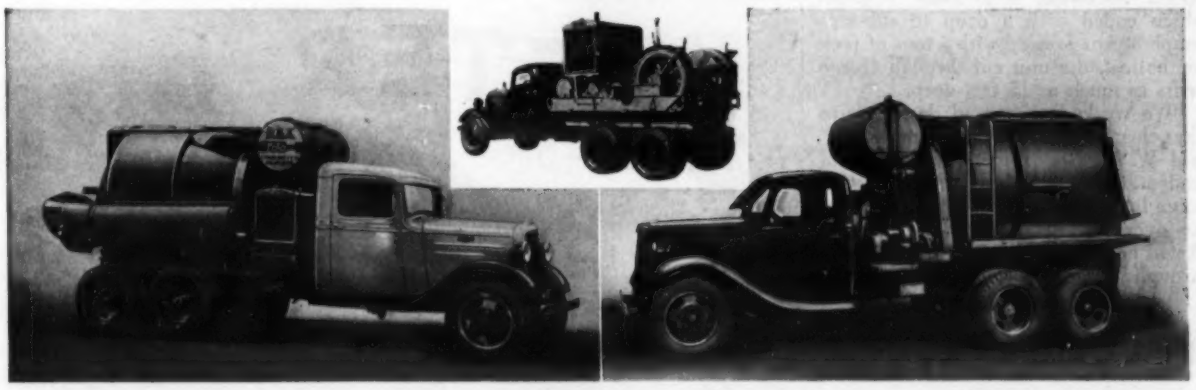
EARTH MOVING EQUIPMENT

Wheelbarrows—All Types . . . Concrete Carts . . . Drag Scrapers . . . Fresno Scrapers . . . Wheeled Scrapers . . . Grading Plows . . . Rooters . . . Also Tractor Equipment . . . Rotary Scrapers . . . Scarifiers . . . Rippers . . . Bulldozers, etc.



The SLUSSER-McLEAN SCRAPER CO. 248 Poplar St. Sidney, Ohio



CONCRETE-CRUSHED STONE-GRAVEL

handled at lowest cost per yard-mile with THORNTON DRIVE

Speed up your operations this modern way, and save on investment, maintenance and operating expense. Find out how Thornton Four Rear Wheel Drive trucks run rings around the heavy, high-priced fellows; how they do time-saving and cost-saving stunts never dreamed of with old-fashiond, clumsy ton-of-truck to ton-of-load equipment. See how others are mounting heavy ready-mix equipment on the Thornton's back for swift load delivery under extreme traction conditions. Watch the Thornton hustle out of a pit with those extra yards of load, then go high-balling down the highway in high. At last speed has been put to work without any sacrifice of dependability!

Verify these strong statements—investigate this new thing—consider it carefully. Our engineering staff is at your service. May we hear from you?

The Thornton Four Rear Wheel Drive makes a heavy-duty truck out of a standard one-and-one-half ton truck, with gross capacity of 26,000 lbs. (wheelbase 142" to 207" each wheelbase correctly engineered to give proper load distribution), accommodating body sizes varying from eight to twenty feet. Thornton dual ratio gears, located between the two rear driving axles, multiply the power without straining the truck transmission line; rocker action springs reduce road impact, and added heavy channels reinforce the frame to 40" under the cab. Thornton equipment may be purchased from the truck dealer, and may be financed through the same channel as the chassis.

U. S. Patents
1897153
2047088

Canadian Patents
356472
357064

TYPICAL OPERATIONS

(LEFT) Thornton—Chevrolet truck with Rex Moto-Mixer. Capacity 2-2½ yds. In service 18 months—operating cost cut down ⅕.

(CENTER) Thornton—Chevrolet truck with Cardwell All-Steel Hoist in use in Venesuela. Four rear wheel drive gives necessary traction.

(RIGHT) Thornton—Ford truck with Jaeger Truck Mixer. Capacity 2-3½ yds. Gross vehicle wt. 28,000 pounds. Replaced chassis costing double.

(BOTTOM) This Thornton-Ford, carrying 7½ yards, made 15 more trips per day than heavy trucks costing twice as much.

FOUR REAR WHEEL DRIVE

THORNTON TANDEM COMPANY
DETROIT, MICHIGAN, U. S. A.
5153 Braden Street

Breaking Through the Results of a Two-Day Blizzard Last Winter in the Town of Westminster, Mass.

Light Truck with Plows Keeps Town's Roads Clear

A Ford V-8 dump truck equipped with a Frink Model 1175P snow plow kept 86 miles of highway in the town of Westminster, Mass., cleared of snow last winter. The illustration shows the unit in action following a two-day blizzard which ended with a drop to sub-zero temperature. Loaded with 4 tons of rock for ballast, the unit cut through frozen drifts as much as 15 feet deep.

"We worked night and day for five days clearing the road on this occasion," said W. H. Goodridge, Road Superintendent. "We changed crews every 4 hours but the truck was kept in continuous operation. The deeper drifts necessitated constant bucking until we broke through."

1,725,000 Yds. of Concrete Poured in 12 Months

On December 6, 1935, Governor C. D. Martin of Washington tripped a 4-cubic yard bucket pouring the first concrete at Grand Coulee Dam. One year later on December 6, 1936, a workman in the general course of a busy day tripped a bucket bringing to 1,725,000 cubic yards the total of concrete placed in the growing dam during the first year.

The first concrete was poured before all the bedrock had been laid bare in the west excavation. In a year this section of the dam was above the water surface of the river, and diversion of the stream through four slots left in the massive structure was under way.

Good progress was made during the year all along the line. The pouring of concrete is now under way in the east excavation as well. An average of nearly 6,000 men has been employed throughout the year by the Bureau of Reclamation and the contractor, the M-W-A-K Co.

The remaining excavation is for the central section of the dam through which the Columbia River flowed. By the end of this month it is expected that the river will have been driven completely from its bed. Two mid-river cofferdams are now under construction. When they have been completed the central section will be unwatered for construction of the last portion of this Reclamation Service dam.

Two steel trestles were constructed in the west excavation for use in placing the concrete. As the interlocking concrete piers of the abutment grew the trestles were extended to the west cofferdam. The steel of the trestles was embedded in the rising concrete as described in the June, 1936, issue of CONTRACTORS AND ENGINEERS MONTHLY.

The concrete in the west abutment is being mixed at the plant on the western side of the river. The east mixing plant, which will prepare the concrete for the eastern abutment, is now going into high-speed production.

New Harnischfeger Dealer For Western Pa. and W. Va.

Announcement was made recently of the appointment of the Frick Reid Supply Corp., 117 Santa Fe St., N. S., Pittsburgh, Pa., as the agency for the Harnischfeger Corp., of Milwaukee, Wis., in western Pennsylvania and northern West Virginia. Walter H. Duncan, who is in charge of the contractors' equipment and supply division of this company, has had a broad experience in the sale of contractors' equipment and has been chief engineer of a number of prominent construction organizations. This company maintains branch supply houses in Clarksburg, W. Va., Bradford, Pa., and Marietta, Ohio.

TENTS
TARPAULINS
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The Fulton line is sold through Contractor Supply Dealers in every state. A quality line priced right. Ask for SHUREDRY and FULTEX Tarpaulins, Tents, Windbreaks.
Write our nearest plant today for catalog, samples and price list.
Fulton Bag & Cotton Mills
Manufacturers Since 1870
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MERELY TILT and POUR

The Smith Tilter is the fastest discharging mixer in the industry. You merely tilt the drum and let gravity pour out the entire batch — the quickest and most practical way of emptying a mixer drum, just as it is the quickest and best way of emptying a pail of water.

Other types of mixers LIFT the material and thus use power to discharge the batch. Why not use gravity, like the big Smith Tilters have done and are doing on huge projects such as BOULDER DAM, NORRIS DAM, TYGART VALLEY RESERVOIR, FORT PECK DAM, MUSCLE SHOALS, and many others.

ORIGINATED BY SMITH 37 years ago, these dependable mixers have never been improved upon. During all these years, Smith Engineers have developed and perfected the design until today the Smith Tilter is universally accepted as the finest and most up-to-date high speed machine for producing big volumes of uniform concrete.

Sizes range from the 2½-S Mascot to the 112-S, the largest mixer in the world. Ask for literature.

THIS NEW CATALOG is just recently off the press. It gives you a complete description of Smith 28-S, 56-S, 84-S and 112-S Tilters. Write for your copy.

LIKE EMPTYING A PAIL
You wouldn't think of emptying a pail with a dipper. It takes too long. The fastest, most practical way is to TILT the pail and POUR out the entire contents.

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SMITH MIXERS
THE BOULDER DAM MIXERS

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Cheaper Dirt-Moving

Powerful, economical machines are these Sauerman Slacklines and Drag Scrapers. They will reach out into a river, hill or pit 1,000 ft. or more and haul materials up to a bin or pile in a simple, straight-line operation at a rapid rate.

Write for 84-p. Catalog

SAUERMAN BROS.
464 S. Clinton St., CHICAGO

Concrete and Girder Bridge in Colorado

(Continued from page 7)

brackets and forms. The sidewalk was poured 5 feet wide and 4 inches thick with a curb and a 32-inch hand rail. The sidewalk brackets were 4 x 4's with 2 x 4 diagonals crossed.

A novel provision, made by the contractor himself after having been "stung" on another job where the grout that leaked through the forms stained the girders and required seemingly endless rubbing for removal, was simply to have a man below the section of deck being poured hosing the girders so that the grout was washed off at once before it dried.

Pouring the Roadway Slab or Deck

The roadway slab is 8¼ inches thick and was poured with two Jaeger 10-E 2-bag mixers. With two large stockpiles of aggregate and a crossing of runways from each pile so that the rubber-tired wheelbarrows could be moved readily to each of the two mixers, pouring of the deck progressed with remarkable celerity. The pair of mixers averaged 20 to 22 cubic yards an hour. Three men were used wheeling sand with one extra shoveling, and four men wheeled stone with two extra shoveling to the wheelbarrows. There was one wheelbarrow scales for the stone and another for the sand to facilitate the weighing. A man was assigned to each of the scales so that the wheelbarrow men had nothing to do but push. The scale men made up the weights as required.

From the two mixers there were six iron-tired concrete buggies pushed over a well-planned runway supported on simple horses made of two legs of 4 x 4's and a length of 1 x 4 on two sides. Over these were laid 2 x 8's for the runway deck. The central runway was laid 9 feet wide, enough for two buggies to pass and the lateral runways were 5 feet, just wide enough for a single buggy. When pouring reached a point where it was necessary to place concrete beneath the runway, the two center planks were removed and the buggy run out on the remaining planks as tracks. On the main runway the ends of the planks were kept from moving laterally by single 16d nails into the horses.

One man sprinkled the oiled forms just ahead of pouring. The heavy reinforcement consisted of ⅝-inch round deformed bars on 5½-inch centers for transverse rods on the bottom and longitudinal rods of the same size 14 inches on centers on the bottom. On top there were two bars spaced 5 inches, then a space of 10 inches, and the two bars repeated. This was for the transverse bars while the longitudinal bars were spaced 14 inches on centers.

The bottom bars were supported by concrete cubes while the upper bars were supported accurately above the lower by 4½-inch nipples of galvanized iron pipe of 1½-inch diameter.

All concrete was vibrated by a Mall vibrator with an extension tube mounted on a turntable base to permit the operator swinging around the entire circle without upsetting the vibrator engine. In placing the concrete four men shoveled and two men tamped, in addition to the man with the vibrator. Over-vibration seemed to be the only trouble in concrete placing when we visited the job, except for the possible loss of considerable grout through the use of a little more water than was necessary with the aggregate which had been soaked by a hard thunder shower the previous day. The water ran across a full section and out the forms which were not tight.

The screed boards were placed 14 feet apart so as to support the 16-foot longitudinal screed or float. The screed boards were 2 x 4's with 2 x 4 blocks to give the proper elevation. These were pulled as soon as the concrete had been screeded and then more concrete carried back from the new section being poured to fill the void. Five hand finishers handled the delicate task of smoothing the deck, sidewalk and curb. They used an 8-foot long-handled float on the deck for the final finish.

For curing, the contractor used a light spray of water as soon as the concrete had set and then, when possible, a ¾ to 1-inch cover of sand was placed and sprinkled for 10 days.

The job was run with a single 8-hour shift but, due to the intense heat, extra men were kept on the side to relieve the regular crew from time to time.

A Channel Change

Cheyenne Creek meets Fountain Creek at the site of the bridge. In order to make a workmanlike job, a slight channel change was made to bring the former creek in close to the embankment so that the structure could be protected better with a heavy riprap which was placed 3 feet thick at the base and continued this thickness up the entire bank on a 1 to 1 slope. The channel change provides a minimum width of 60 feet for the channel with 1½ to 1 underwater slopes.

Major Quantities

Unclassified excavation, channel change	30,000 cubic yards
Dry rock excavation, structure	10 cubic yards
Dry common excavation, structure	1,130 cubic yards
Wet rock excavation, structure	655 cubic yards
Wet common excavation, structure	2,860 cubic yards
Rock surfacing	3,100 cubic yards
Class A concrete	1,335 cubic yards
Class B concrete	350 cubic yards
Reinforcing steel	185,300 pounds
Structural steel	630,500 pounds
Heavy riprap	1,570 cubic yards

Personnel

This bridge project ERP 6 and FAP 118R and Extended was awarded to Frank M. Kenney, contractor, of Denver, Colo. Joe Davis was Superintendent for the contractor, and Glen McEldowney was Resident Engineer for the State Highway Department of Colorado.

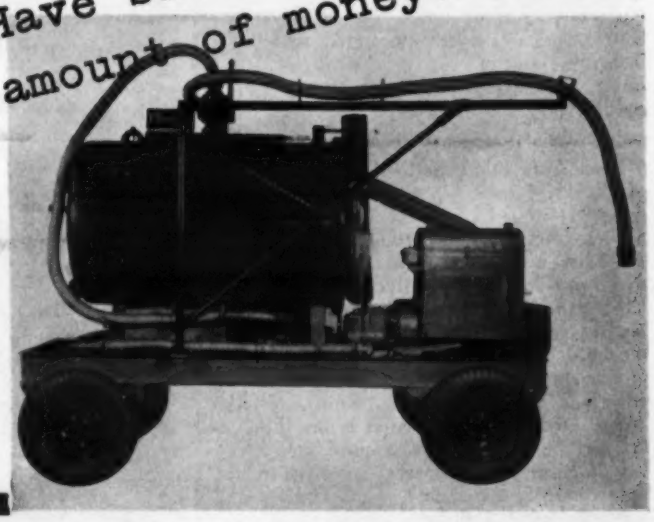
At the end of last year, the Guatemalan Department of Roads had in project or under construction 1,320 miles of roads. The U. S. Bureau of Foreign and Domestic Commerce reports that figures indicate a total of 3,334 miles of roads constructed and now in use. Included in this figure is the Inter-American Highway, extending from the Mexican border to the Salvador border, totaling 317 miles. Practically all of the existing roads in Guatemala are of the earth and gravel type.

C. & E. M. Photo

Concreting and Finishing the Deck of the New Fountain Creek Bridge

"We heated over 3,000,000 gallons of Bituminous materials with Cleaver Equipment and would never go back to the old boiler system. Have saved an untold amount of money."

*(Name on request)



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No. 1½ Pumping Booster
Also made in two other sizes.

MONEY SAVING FEATURES ORIGINAL WITH CLEAVER

- **Quicker steaming—30 minutes from cold water start. Saves idle time.**
- **Low water consumption. Approximately one barrel of make-up water per car heated. Saves water haulage.**
- **Light, compact, easy to transport. Mobility permits location point nearest work. Saves hauling costs.**
- **Over 80% efficiency steam to fuel. Large saving in fuel cost.**
- **Use of return condensate prevents excessive liming inside boiler. Increases efficiency and saves fuel.**

CLEAVER-BROOKS COMPANY

Originators of specially built Tank Car Heaters and Boosters for bituminous materials

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Keeping Records For Tax Advantage

Final Article of Series Sets Forth Regulations For Records Required by Social Security Acts

By U. S. GREENE, C.P.A.,
Co-Author of "Planning for Tax Economy"

ONE of the most important principles in planning for tax economy is that whatever optional courses are adopted by the taxpayer must be reflected in the accounting system in order to become effective. The basis for definition of the tax is the accounting facts forming the basis of the taxpayer's report. The transactions or procedures of the taxpayer preceding the records are presented to the tax authorities in reports which are predicated upon the taxpayer's accounting records. If these accounting records accurately portray the personal and business transactions of the taxpayer, he is in position to maintain the burden of proof which invariably rests upon him. By far the greatest cause of tax disputes, as shown in the many contested tax assessments before the tax bureaus, commissions and courts, is inadequate or inaccurate accounting records.

This principle has a conspicuous application in the case of Federal Social Security and State Payroll tax laws. Numerous opportunities for optional courses of action are presented under these laws, but in order to assure a maximum tax saving, these selective procedures must be accurately recorded.

Federal Statutory Provisions

Bearing in mind the distinctive types of taxes imposed respectively by Sections VIII and IX of the Federal Social Security Act, it is important to observe the difference in times when the respective provisions became effective. Section IX levies the unemployment insurance tax upon employers of eight or more on the total payroll, including all salaries of officers of corporations, and became effective January 1, 1936. Employers are allowed as a deduction from this tax the amount of state unemployment tax paid for the calendar year 1936 to the extent of 90 per cent of the Federal unemployment insurance tax.

On the other hand, the provisions of Title VIII, covering old age benefits, are effective from January 1, 1937, and apply to the first $3,000 of compensation to employees under 65 years of age. Therefore the consideration of records for these exactions is a matter of current importance. In view of the imminent necessity for the initial setting up of records under the old age benefit sections of Title VIII, that title will receive first attention in this discussion.

Editor's Note: Mr. Greene is C. P. A. in the States of New York, North Carolina and Indiana, is a Member of the American Institute of Accountants, and was formerly an auditor for the United States Bureau of Internal Revenue.

Records Required by Title VIII

Article 412 of Regulations 91, relating to Title VIII, provides that "Every employer liable for tax shall keep accurate records of all remuneration paid to his employees after December 31, 1936, for services performed for him after such date. Such records shall show with respect to each employee: (1) the name and address of the employee and the account number assigned to the employee under the Act; (2) the occupation of the employee; (3) the total amount (including any sum withheld therefrom as tax or for any other reason) and date of each remuneration payment and the period of services covered by such payment; (4) the amount of such remuneration payment which constitutes wages subject to tax, and (5) the amount of employees' tax withheld or collected with respect to such payment, and, if collected at a time other than the time such payment was made, the date collected.

"If the total remuneration payment (paragraph 3, above) and the amount thereof which is taxable (paragraph 4, above) are not equal, the reason therefor shall be made a matter of record. Accurate records of the details of every adjustment of employees' tax or employers' tax shall also be kept, including the date and amount of each adjustment.

"No particular form is prescribed for keeping the records required by this subdivision. Each employer shall use such forms and systems of accounting as will enable the Commissioner to ascertain whether the taxes for which the employer is liable are correctly computed and paid."

These provisions are explicit as to the matter required to be shown on records upon which the tax under Title VIII is based. Although the Regulations state that no particular form is prescribed for keeping these records, they do pre-

(Continued on page 32)

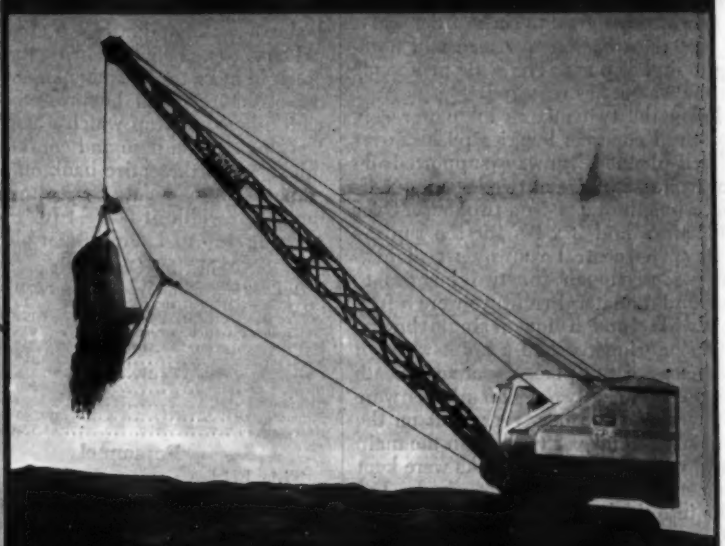
HIGH CAPACITY 4" PUMP
Self-Cleaning; high suction lift

Self-priming
• Open type trash impeller
• 4-cylinder engine
• Spring Mounted

FIG. 420 MARLOW PUMPS
RIDGEWOOD, N. J.

PILE HAMMERS
and
EXTRACTORS
HOISTS—DERRICKS
WHIRLERS
•
Special Equipment
Movable Bridge Machinery
•
Write for descriptive catalogs.
McKIERNAN-TERRY CORP.
19 Park Row, New York
Distributors in Principal Cities

NEW Bucyrus-Erie 17-B



WITH this speedy, powerful 17-B, Bucyrus-Erie adds a new 1937 ½-yard machine to its world-famous complete line of modern excavators.

This completely new machine is designed along the same lines as the world's fastest selling ⅜-yard 10-B. It offers you the same important features of fast digging and fast swinging, high-speed travel and easy maneuverability, compact design, husky power, and accurate control.

Gasoline, Diesel or electric power. Fully convertible, shovel, dragline, clamshell, crane, dragshovel, or skimmer scoop. Gasoline engine, 79 H.P. Two-speed propel. Special trailer available. Hooked, conical rollers (no center pintle). Big, slow-speed, clutches; parts interchangeable. 37 anti-friction bearings. Automatic lubrication. Full-vision, full-opening, air-conditioned cab.

Write today for full information on this new ½-yard winner!

BUCYRUS-ERIE
EXCAVATING, DRILLING, AND MATERIAL HANDLING EQUIPMENT... SOUTH MILWAUKEE, WISCONSIN, U. S. A.

Gotshall, Gen. Sales Rep. Of Caterpillar, Dies

Robert W. Gotshall, General Sales Representative for the Caterpillar Tractor Co., and a pioneer in the development of tractor-type tractors and road equipment, died in Peoria, Ill., on February 11 after a six-months' illness.

Mr. Gotshall was born in Minneapolis in 1882 and was graduated from the School of Engineering of the University of Michigan in 1906. After a brief association with the Union Iron Works of Minneapolis, he joined the Holt Mfg. Co. of Stockton, Calif., and under his supervision the first crawler tractor built east of the Rockies was produced at Peoria. Mr. Gotshall remained with this company until its merger with the C. L. Best Tractor Co. when the Caterpillar Tractor Co. was formed. In 1925 he joined the Monarch Tractor Co. and later the Allis-Chalmers Mfg. Co. when that firm took over the Monarch business. Two years ago he rejoined the Caterpillar organization as General Sales Representative, which position he held until his death.

Ohio's Fifth Safety Highway Near Akron Dedicated

Another auto-accident area, a mile of heavily-traveled Route 18 west of Akron, Ohio, has been transformed into an educational safety highway, the fifth such demonstration stretch to be inaugurated by the Ohio Safety Council.

A system of General Electric high-visibility incandescent luminaires, consisting of 39 luminaires each equipped with a 4,000-lumen bar-filament incandescent lamp placed 125 feet apart and suspended 25 feet above the pavement, is only one of the safety features of the demonstration stretch, which is a straight two-lane concrete road. Educational signs along the way call the attention of motorists to the importance of highway safety. At a main intersection, a dangerous night-accident area, a 10,000-lumen sodium luminaire has been installed, the golden-orange light serving as a warning signal.

More than 100 safety leaders attended the dedication ceremonies, which were held under the auspices of the Akron Safety Council.

MOTORISTS
APPRECIATE THE
"TRACTIONIZED"
SKID-SAFE SURFACE
OF A
TARVIA ROAD

Barrett
Tarvia
GOOD ROADS
AT LOW COST

THE BARRETT COMPANY New York Chicago Birmingham St. Louis Detroit Buffalo Providence Lebanon Rochester Baltimore Minneapolis Cleveland Columbus Philadelphia Toledo Youngstown Syracuse Hartford Boston Milwaukee Cincinnati Bethlehem Portland, Me. Norwood, N. Y. In Canada: THE BARRETT COMPANY, LTD. Montreal Toronto Winnipeg Vancouver

Concrete Paving On Traffic Link

(Continued from page 1)

3 miles away. A Northwest crane rehandled the aggregates from the stockpiles to the Blaw-Knox batching plant where the batches were weighed out with 1,412 pounds of sand, and 2,013 pounds, both dry weights, of gravel.

Cement from the Missouri Portland Cement Co. was delivered in standard box cars to Chesterfield about ¾-mile from the batching plant and dumped on a large wooden platform from which it was shoveled by five men to three Johnson Kone Karts and weighed on a well-enclosed Fairbanks platform scale. The dumping platform had two slots through which the bulk cement, 596 pounds to the batch, was dumped into holes prepared in the aggregates. A man stepped from a platform, which was well canopied by layers of burlap, onto the batch trucks and shoveled the aggregates to provide the hole for the cement. Each truck driver covered his truck with the provided canvas before leaving the batching plant for the road.

The fleet of batch trucks, each carrying two batches, consisted of six trucks for the first mile of haul and one truck was added for each ½-mile of additional haul. The fleet varied from six to ten trucks.

Pouring the Concrete

For a typical example of Missouri paving of a 20-foot slab we will describe the methods and organization required for handling a 20-foot strip on one of the 40-foot sections.

Prior to the fine grade operations, a foreman and two men with a Caterpillar Twenty and Galion 10-foot blade roughed out the subgrade. This was followed by a Ted Carr Formgrader after which two foremen and six men set rather closely the 9-inch Blaw-Knox steel forms. The fine grade was prepared by a Caterpillar Twenty and an Aurora grader with a 6-foot blade. Where the grade was high and the grader left windrows of material a team and fresno moved the earth out from between the forms, aided by a crew of seven men in the fine-grade crew. A heavy grade planer and checker was pulled over the grade and on the forms by the small tractor, after which the grade was rolled by a 5-ton Buffalo-Springfield gas roller. Every foot of the forms was mechanically tamped with a power tamper riding the forms. One of the foremen and two men from the form-setting crew went back and lined the forms and hand-tamped under the base wherever the form had been moved.

The concrete was mixed for 60 seconds after the cement, aggregates and 60 per cent of the water were in the drum of the Koehring 27-E paver which pulled a standard trail-grader. Two men shoveled the excess earth from the grader which was followed, still ahead of the concrete, by a hand-pushed checking template. It was found that if the ground was hard and high the pulled trail-grader had a tendency to ride over the high spots in spite of the men riding the grader. The hand-pushed check template stuck when the men pushed it and it hit high spots.

As the paver ran in the space between the forms, it was necessary for the men setting the expansion and contraction joints to work fast. These joints were the standard Missouri specification joints with air space for the expansion joints. In addition a center plane of weakness was created by the installation of marker seals which consist of two strips of sheet iron welded to form a T measuring 4 inches across the top, the vertical 2 inches extending into the pavement. The ends and the center of the top of the T are bent down to key the strip to the concrete. It is further perforated at 2-inch intervals, with the material punched out turned down to act as lugs for further bonding.

Immediately ahead of the expansion and contraction joints the seven rolls of paving paper were unrolled on the grade to protect the concrete from absorption of its mixing water by the grade. The paver pulled a strike-off with the hoist mechanism, which struck off the concrete 1¾ inches below the top for the placing of the reinforcing mesh.

Dowels across the center joint were placed at 5-foot intervals. They were 4 feet long of ½-inch round deformed bars, placed beneath the reinforcing mesh, and held in place by dowel bar supports or chairs driven into the ground.

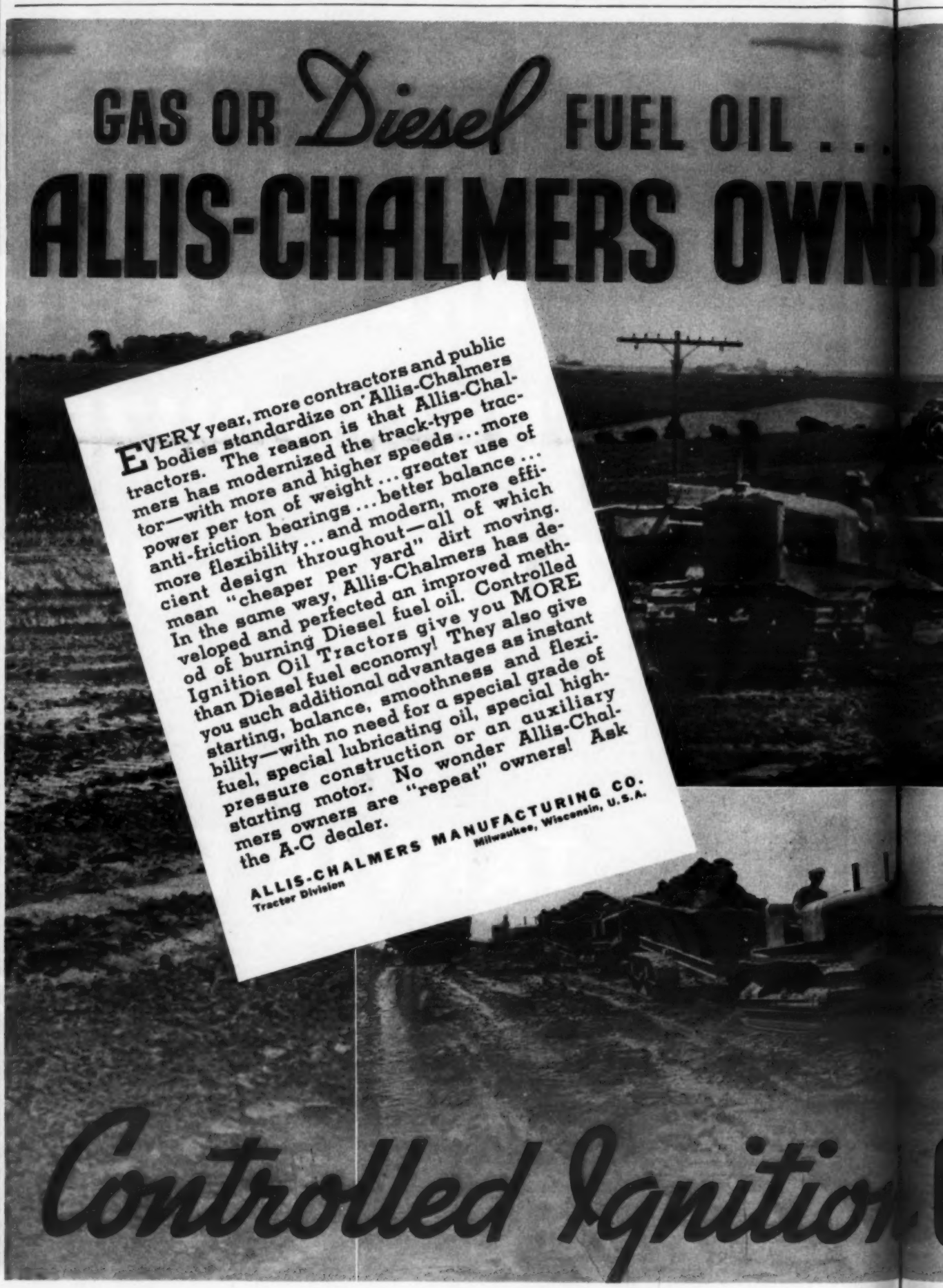
The concreting crew consisted of the paver operator, four men puddling, two men spading the edge against the forms, two steel men placing dowels and handing in the mesh to the puddlers, two men on expansion joints as well as contraction joints which were placed 50 feet apart and alternated.

Finishing

As soon as the top concrete was placed, the Ord finishing machine went over the fresh concrete and screeded it. On the second pass of the finisher an 18-inch diameter cutting wheel attached to the back of the machine was forced into the concrete to cut the slot for the center marking strip. A double bridge behind the finisher carried the two men installing the center marking strip.

Hand finishing included a 10-foot drag straight-edge with the finisher on each side working from the center. Each finisher also used a 4-foot long-handled float. A 1-inch outside diameter red rubber hose was used to drag over the surface to remove excess water and laitance. The two 10-foot straight-edges were used for checking the surface for irregularities. When the checking was satisfactory to the finishers they used the two 3-ply 8-inch-wide canvas belts.

Concrete for the lip curb on grades and the inside of super-elevated curves was taken back from the paver by a wheelbarrow. The lip curb, 3 inches high and 9 inches wide, was built by the one man wheeling concrete who shoveled the concrete to the lip curb forms, one builder and a finisher. The hand finishing crew for the job consisted of two


GAS OR Diesel FUEL OIL . . .
ALLIS-CHALMERS OWN
EVERY year, more contractors and public bodies standardize on Allis-Chalmers tractors. The reason is that Allis-Chalmers has modernized the track-type tractor—with more and higher speeds ... more power per ton of weight ... greater use of anti-friction bearings ... better balance ... more flexibility ... and modern, more efficient design throughout—all of which mean "cheaper per yard" dirt moving. In the same way, Allis-Chalmers has developed and perfected an improved method of burning Diesel fuel oil. Controlled Ignition Oil Tractors give you MORE than Diesel fuel economy! They also give you such additional advantages as instant starting, balance, smoothness and flexibility—with no need for a special grade of fuel, special lubricating oil, special high-pressure construction or an auxiliary starting motor. No wonder Allis-Chalmers owners are "repeat" owners! Ask the A-C dealer.
ALLIS-CHALMERS MANUFACTURING CO.
Tractor Division
Milwaukee, Wisconsin, U.S.A.
Controlled Ignition

head finishers, two edgers, one joint cutter and a center joint cutter who worked from a double bridge with a longitudinal plank across the center.

Curing

Two men followed the two belt finishing operations and spread the wet burlap over the green concrete. One man sprinkling followed immediately after. The burlap, according to the 1935 specifications under which the contract was let, could be taken off the following morning. The 1936 specifications require that the wet burlap be left on for 24 hours.

Following the removal of the burlap, the crew of six men who handled all the work at the tail end of the job, pulled the forms, bladed the earth against the edge of the slab and spread the Solvay calcium chloride crystals with a spreader cart at the rate of 2 pounds per square yard. They luted them to insure complete coverage.

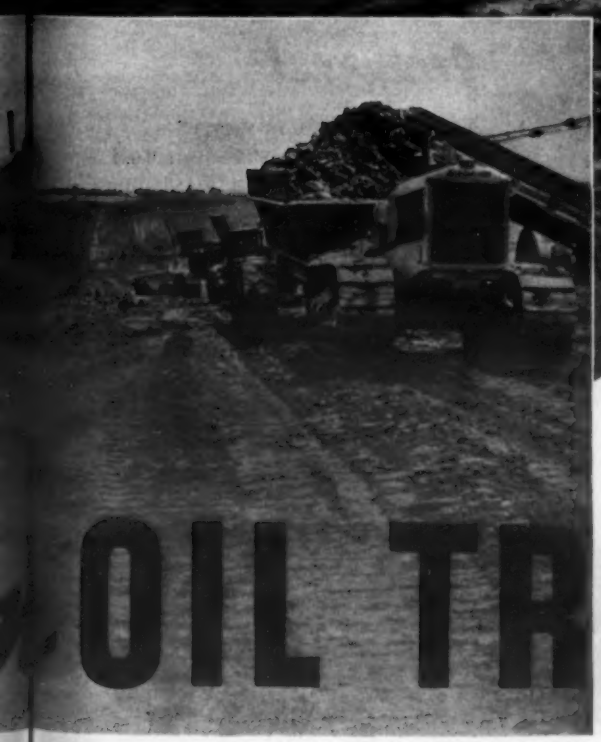
Personnel

This contract was awarded to M. E. Gillioz of Monett, Mo., in 1935 and but for unforeseen difficulties would have been completed very early in the 1936 construction season. C. B. Maxey was Superintendent for the contractor and Frank M. "Buster" Graham was Project Engineer for the Missouri State Highway Department.

Speed record for highway building in China is held by a 50-mile stretch in Hupeh province, completed in less than a month. —*China Economic Journal*

Flood Damage to Highways

It is estimated since the flood waters of the Ohio and Mississippi Valleys have receded that 15,000 miles of state highways are in need of reconstruction and intensive maintenance, at a cost in excess of $15,000,000. This figure will be increased as state highway departments are able to complete their surveys of damages and county and town roadways are added. It is important that immediate attention be given to the restoration of these roads so that the agencies of rehabilitation may be able to cover the entire territory quickly with the heavy loads of construction materials and staple products quickly and without danger.



FRANK EBLEN
"REPEATS"

One of the contractors who took the first experimental Model "L" Tractor and "gave it the works" was Frank Eblen of Walnut, Ia. Eblen was so favorably impressed with the experimental machine that he ordered Model "L's" for his own use as soon as they went into production—and he has been a consistent Allis-Chalmers user ever since. Some of his present A-C tractors are shown here.

OIL TRACTORS

Stabilized Contract On Minn. Highway

(Continued from page 2)

and was picked up by a bucket elevator and returned to the screen.

An interesting feature of the crushing and screening plant was the novel method of driving it. A Wisconsin 75-hp and a 90-hp Waukesha motor were belted to the same pulley on the plant shaft with one belt running on top of the other.

The material from the primary crusher to the plant was handled by a belt conveyor and similarly the final material passing the screen was taken by another belt conveyor to a 23-cubic yard hopper for delivery to the trucks which hauled it to the road. Immediately beneath the hopper was a 15-ton American Scale Co. pitless platform scale for weighing the loads. A fleet of five Ford V-8 dump trucks with steel bodies and Wood hydraulic hoists hauled 4-ton loads to the road.

The plant organization included the two men feeding the crusher, a crusher operator, an oiler, a plant foreman, a plant superintendent, and the weighman. The job was run with two 8-hour shifts, one from 4 A. M. to noon, and the other from 12 noon to 8 P. M. The laborers were limited to a 40-hour week. The contractor ran his quarry and crushing plant after dark on many occasions, using a Kohler 1,500-watt lighting plant for the lights as well as for power for the emery wheel and other small tools.

The Stabilized Limestone Section

The 3-inch base of crushed limestone was laid 16 feet wide by using two Bros spreader boxes for a distance of 0.2 mile and then the boxes were returned and the other width of the 32-foot base was spread in a similar manner. This permitted the sprinkling truck and the roller to complete the first section laid. A tank truck kept the material damp enough for efficiency in compaction during rolling with the two Austin 10-ton rollers. On the base course, 0.5-gallon of water and on the surface course 1.25 gallons of water per square yard was used.

Two men handled the spreader boxes, attaching them to hooks on the frame of the trucks fixed at a point about opposite the hydraulic hoist. These men went back and raked the slight windrow of material that piled up on either side of the box while waiting for the next truck to pull up and back into position.

The 3-inch surface course was placed in exactly the same manner as the base and of the same screened material in the same proportions. The only difference was the application of 3,560 pounds of calcium chloride for each 0.2 mile of 32-foot road on the surface course while it was still damp. The calcium chloride was hauled by a dump truck and spread with a calcium chloride spreader hauled by the same truck. Three men rode the truck and emptied the bags of chloride into the hopper of the spreader as it was pulled along by the truck.

Personnel

John Elzy was General Superintendent for the contractors and G. J. Sullivan was Resident Engineer for the Minnesota Department of Highways on this $142,923.99 contract.

Westinghouse Office to Move

The Westinghouse Electric & Manufacturing Co. will move its Pittsburgh office and some of its general offices, including the sales department, now located at East Pittsburgh to the Union National Bank Building in Pittsburgh, to facilitate their operations. The move will be made about May 1.

Wellpoints Deliver Salt Water for Jetting

(Continued from page 14)

the Faircroft Engineering Co. The average penetration pile was 21 feet. A Bucyrus-Erie steam crane was used for handling the piles. This crane equipped with a McKiernan-Terry steam hammer was used for the final driving of the piles to a minimum bearing of 20 tons.

For jetting, two 2½-inch diameter jet pipes reduced to 1¼-inch at the nozzle were used. Water for jetting was furnished by Griffin wellpoints through 60 feet of 6-inch header. The wellpoints were set in the ocean in a line at right angles to the beach for the first system and the second, another 20 wellpoints, was located in the ocean at low tide mark parallel to the beach. A Griffin wellpoint pump was used on the wellpoints, delivering 600 gpm to the pressure pump. Twenty of these wellpoints furnished enough water for two jetting streams at 140 pounds pressure.

Personnel

These contracts were carried on under the direction of Charles Gold, Mayor and Commissioner of Public Works, and Joseph Lipset, City Engineer, with James B. Martin as Engineer in charge of construction and Stanley Meleski, Field Engineer. Svend Erichsen was Resident Engineer for the PWA.

New Excavator Features Control

Accuracy of control, which is so important when loads must be spotted exactly or when digging must be done to accurate grades, is a feature of the new Keystone Model 18A 1-yard excavator made by the Keystone Driller Co., Beaver Falls, Pa. The use of planetary drives and oversize clutches is designed for efficient operation in service necessitating constant slippage of the clutch for long periods of time, plus smooth easy control. The manufacturer states that this is the only full-revolving 1-yard excavator with planetary swing mechanism.

The Model 18A is built for a wide variety of digging, having one boom that is used in both trench hoe and skimmer service and to which a short extension may be attached for short-boom crane service. The machine may also be rigged with a boom for dragline, clamshell and crane work.

The oversize clutches and planetary drives for both boom swing and line movement make it possible to ease loads into position with precision. The loads may be picked up as gradually or as quickly as desired and moved at the speed most practical for each kind of job. In close quarters the great accuracy of control and short tail swing facilitate many operations.

This machine is powered by Buda engines either gasoline or diesel or if desired by any standard make of electric motor. The machine has an all-metal, streamlined cab with a paint job to enhance the streamline effect. Standard jobs are painted a bright red with silver streamline and top. All moving parts and the car body are black.

This machine was announced at the Road Show in New Orleans through motion pictures. Keystone Driller Co. originated the trench hoe and skimmer types of excavator, and in this its latest machine the application of these two types of bucket is brought to a high degree of efficiency.

with Octopus-Like cunning
The OWEN *TYPE "RA"* GRAPPLE

grips and lifts rocks, regardless of shape... Each of 4 tines makes contact with the rock, handling its share of the load. Easier placement and greater security of grip assure increased tonnage in handling rocks, scrap iron, timbers, etc. Write for new bulletin.

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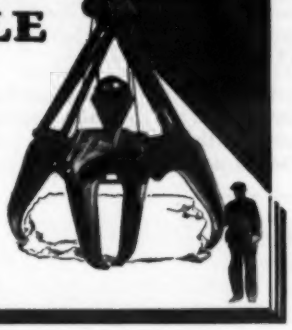

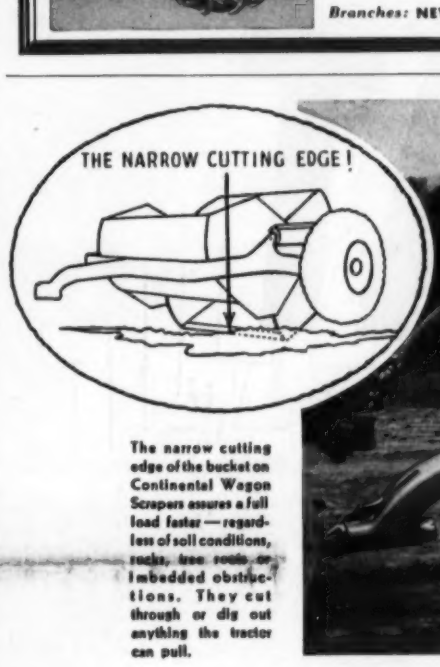

The narrow cutting edge of the bucket on Continental Wagon Scrapers assures a full load faster — regardless of soil conditions, rocks, tree roots, or imbedded obstructions. They cut through or dig out anything the tractor can pull.

they out-dig all others!

Continental Wagon Scrapers out-dig all others! The reasons for this superior performance are simple — it's the fast digging, narrow cutting edge of the bucket — plus the rigid stability of Continental two-wheeled design.

The narrow, sharp cutting edge takes a bite the instant it touches the dirt — digs deep and forces a fast load — cuts through or digs out anything the tractor can pull — rocks, tree roots, and other imbedded obstructions. The depth of cut and bucket opening are adjustable. Two-way hydraulic controls allow for positive and accurate manipulation of the cutting edge regardless of soil conditions.

Continental Wagon Scrapers *Load, Haul, and Dump Faster!* They are strongest, yet lightest in weight, per yard of capacity. They backfill entirely over a fill, against walls or culverts, and are widely used for spreading and grading.

No matter what your dirt moving job may be — use a Continental Wagon Scraper to *get lowest cost per yard.* Made in 5, 7, and 10 yard sizes, mounted on rubber tired wheels, or crawlers for use with all sizes of crawler tractors.

May we give you details on how others have cut their dirt moving costs with Continental Wagon Scrapers one-half or more under other dirt moving methods?

Sold and serviced by Allis-Chalmers dealers everywhere.

CONTINENTAL ROLL & STEEL FOUNDRY COMPANY
Tractor Equipment Division
Railroad Ave.
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8 other Continental features!

1. Lightest in weight, yet strongest!
2. Simplest in design and all working actions!
3. Require less tractor power!
4. Backfill entirely over a bank!
5. Dump in close quarters!
6. Turn short and back easily!
7. Load, dump and haul faster!
8. Used for spreading and grading, too!

MATERIAL MAKING MACHINERY SUPERIOR ROAD

CONTINENTAL WAGON SCRAPERS

"DXL" DRAGLINE BUCKET

Built of special alloy steel, it has the light weight for easy handling and the strength for fast digging.
Write for details
THE WELLMAN ENGINEERING CO.
7012 Central Ave., Cleveland, Ohio

WILLIAMS
POWER-ARM, POWER-WHEEL, MULTIPLE-ROPE, DRAGLINE ..... *buckets*

The New Ransome Pneumatic Concrete Placer

Improved Pneumatic Placer For Concreting Tunnels

The Ransome Concrete Machinery Co., Dunellen, N.J., manufacturer of concrete mixing, paving and handling equipment, has announced a new pneumatic concrete placer especially adapted for the lining of concrete tunnels. Mixed concrete is placed in the charging opening after which a horizontal sliding door operated by compressed air is forced against a machined seat sealing the intake opening. An air jet is provided for cleaning this sealing door, keeping it free of concrete in order that it may make an airtight seal.

A worm feed in the bottom of the cylindrical receptacle forces the concrete into the discharge chamber where air is applied which carries the batch of concrete through the pipe line to the point of deposit. It is claimed that due to the worm feed construction a minimum amount of air is required to move the concrete, the number of blocks in the discharge line is materially reduced, the output is increased for given sizes, and headroom, width, and length for a given capacity, are greatly reduced. The worm is made of special heat-treated steel and is furnished with renewable wearing sleeves on the shaft.

The worm is driven by an Ingersoll-Rand Type HH air motor through a reduction gearing when electric power is not available. This air motor may be used with safety in tunnels where the fumes from gasoline engines would prohibit their use. All control levers center at the operator's position adjacent to the charging door so that the one operator controls the air motor, the charging door, and the air valves used for the discharge of the batch of concrete.

Detachable flange couplings are used on the discharge pipe which permits quick uncoupling of sections for cleaning out the pipe line. These machines are manufactured in ¼, ½ and 1-cubic yard capacities and are fully covered by patents.

Complete information on this new concrete placer may be secured direct from Ransome by mentioning this magazine.

New ⅝-Yard Excavator

The new 19-B ⅝-yard excavator, recently announced by Bucyrus-Erie Co., South Milwaukee, Wis., is a companion machine to the 10-B ⅜-yard unit and has the same features of easy mobility, compact design, high-speed cycle, and convenient convertibility.

The 19-B weighs only 16 tons, has a travel speed of 1¾ mph, a swing speed of 4¾ rpm and a hoist line speed of 184 fpm. Gasoline, electric or diesel power is available. Because of its compact design, the 19-B may be moved from job to job at fast trucking speed on a special trailer available for it.

This new ⅝-yard machine is constructed for high-speed performance as well as rugged strength. The streamlined cab provides full visibility and complete ventilation for the operator, and with doors opening on all sides also offers quick accessibility to the main machinery. The narrow overall width and short tail swing permit normal operation in tight quarters and its dumping height gives it an unusual working range.

Seven types of front end are available, making it possible to convert the machine quickly and easily from shovel to dragline, clamshell, lifting crane, drag shovel, skimmer or backfiller.

A well-illustrated bulletin, describing this new machine in detail, may be secured direct from the Bucyrus-Erie Co., by mentioning this magazine.

The New Bucyrus-Erie 19-B Excavator

South Bend

Bituminous Material Distributor

EMBODYING 29 YEARS' EXPERIENCE

ECONOMICAL — EFFICIENT — STURDY

NON-DRIP SPRAY BARS — QUICK SHUT-OFF

ACCURATE APPLICATION — IMPROVED HEATING

MUNICIPAL SUPPLY COMPANY

SOUTH BEND, INDIANA

The Pioneer of 4 Years Ago

IS STILL THE LEADING

TWO-STAGE AIR-COOLED

Portable Compressor

IN 1933 the pioneer Ingersoll-Rand Two-Stage, Air-Cooled, Portable Compressor was placed on the market. It was immediately successful, and today, four years later, it remains the leader, far in advance of the field.

The popularity of these machines is due; to their advanced design; to the use of the best available materials and high grade workmanship; and to the company's world-wide sales and service organization.

Specific advantages are: Independent cooling system—water-cooling for the engine and air-cooling for the compressor; constant level lubrication—nothing to break, wear or clog; trouble free valves and oversize adjustable Timken mirror-finish, tapered-roller bearings, assuring long life under all load conditions.

You can choose from five sizes of compressors, each available with either gasoline engine, oil-engine, or electric-drive, and in any of the standard types of mounting.

For further information, ask for catalog No. 3164, or phone, wire or write our nearest office.

Atlanta, Birmingham, Boston, Buffalo, Butte, Chicago, Cleveland, Dallas, Denver, Detroit, Duluth, El Paso, Hartford, Houston, Knoxville, Los Angeles, Newark, New York, Philadelphia, Pittsburgh, Salt Lake City, San Francisco, Scranton, Seattle, St. Louis, Tulsa, Washington

Ingersoll-Rand

11 BROADWAY, NEW YORK CITY

$200,000 in Prizes Offered to Welders

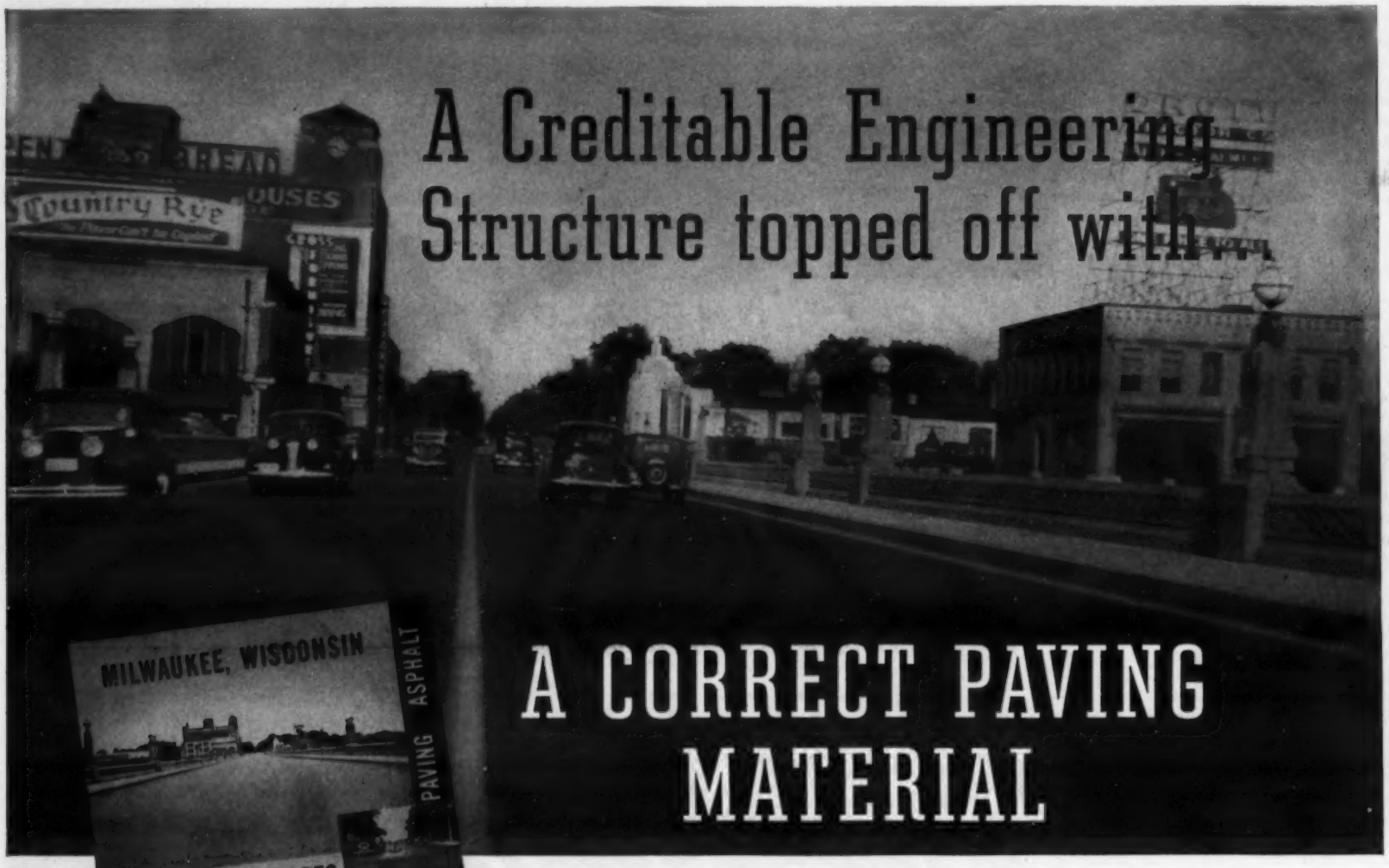
One of the richest awards ever established for competition in the field of mechanical science has just been announced by the James F. Lincoln Arc Welding Foundation. To stimulate intensive study of arc welding, $200,000 will be distributed by the Foundation among the winners of 446 separate prizes for papers dealing with this subject.

The principal prize winner will receive not less than $13,700. Other prizes range from $7,500 to $100, the latter sum to be awarded to each of 178 contestants who receive no other prize, but whose papers are judged worthy of honorable mention.

In order to assure equal competitive opportunity, similar prizes are offered in the eleven major divisions of industry covered by the contest, including automotive, aircraft, railroad, watercraft, structural, furniture and fixtures, commercial welding, containers, welderies, functional machinery, and industrial machinery. Wide diversification of awards is effected by further dividing each major industry into various subdivisions, and the entrants are required to select in advance the particular subclassification to which their papers will relate.

To participate in this contest, it is necessary that submitted papers describe either the redesign of an existing machine, structure, building, etc., so that arc welding may be applied to its manufacture; or that they present a design, either in whole or in part, of a machine, structure, building, etc., not previously made, the description to show how a useful result, which was impractical with other methods of construction or could be done better by arc welding, is obtained. Contestants must have papers in duplicate on file with the Secretary of the Foundation at Cleveland, Ohio, not later than June 1, 1938.

Prospective entrants should communicate promptly with A. F. Davis, Secretary, The James F. Lincoln Arc Welding Foundation, P. O. Box 5726, Cleveland, Ohio, for complete details.



This advertisement appeared on completion of the paving of W. Wisconsin Avenue (from North Story Parkway to North 35th St.) in Milwaukee. This work was known as U. S. Public Works Project NRM268-E and was carried on under the supervision of the Wisconsin State Highway Department. This street carries traffic of U. S. Highway 18 and Wisconsin State Highways 19 and 30.

The upper photograph shows a section of this job over the Wisconsin Avenue viaduct as it appears today.

Standard Oil (Indiana) Engineers will be glad to consult with you on the selection of paving materials to meet your particular paving problems.

STANOLIND SHEET ASPHALT

THREE YEARS AGO this advertisement said: "No other paving material makes paving dollars go so far in long-wearing road miles."

Although the pavement illustrated has only started on a marathon of years of maintenance-free service, it does show what can be done, where high grade engineering and Stanolind Asphalt Products are combined. Despite heavy traffic demands or extreme weather conditions, Stanolind Sheet Asphalt will fully justify the confidence and judgment of engineers and contractors that recommend it.

We repeat again. Stanolind Sheet Asphalt will give *you* more long-wearing road miles and at the lowest cost when based on ultimate economy.

Copr. 1937, Standard Oil Co.

Asphalt for every purpose STANDARD OIL COMPANY (INDIANA)

A Road-Mix Contract In Central Indiana

Retread Methods Used By Ralph Rogers Co. on Surfacing of New Road East of Bloomington

By E. A. SMITH, Project Engineer, State Highway Commission of Indiana

THE retread paving for FAP 128-B in Brown County, Ind., for which Ralph Rogers Co., of Bloomington, Ind., was the contractor and whose work on the grading and drainage sections of this contract was described in page 5 of the December issue of CONTRACTORS AND ENGINEERS MONTHLY, consisted of constructing a waterbound base primed with tar, placing the retread aggregate, applying and mixing asphalt with the aggregate, rolling and the final application of asphalt.

Preparing the Base

The newly-constructed waterbound base was swept clean of all loose screenings with a rotary wire broom mounted on an Allis-Chalmers pneumatic-tired tractor. The base was then primed with 0.4-gallon per square yard of TC tar and permitted to cure from three to ten days, depending on conditions. This tar penetrated the limestone screenings in the top of the waterbound base. The tar was applied by two 850-gallon distributors mounted on Model T-23-A 1½-ton GMC truck chassis and Premier trailers as semi-trailer units. The distributor motor is a LeRoi CPR 4 engine. These distributors were made in the contractor's shop.

Placing Aggregate

When the tar prime was sufficiently cured, the retread aggregate, crushed limestone No. 2, graded from 2 inches down to ½-inch, was placed 3 inches deep, loose measurement, on the base by an Adnun bituminous paver. This machine places material a uniform depth and one-half the width of the roadway without the use of side forms for line and grade. It is propelled by a Waukesha motor and the weight is supported by four steel roller-type drive wheels in the rear which travel on the newly-laid stone, and two solid rubber-tired drive and guide wheels in front. The necessary alignment is secured by placing a string line along each edge of the desired construction and following it with the indicator mounted on the paver.

After the aggregate was placed, an earth wedge at least 3 feet in width was placed against the crushed stone, so that the stone and the earth shoulder could be compacted in the rolling operation of keying and compacting the bituminous retread.

Application of Asphalt

Following this, 0.7-gallon of RC-3 asphalt per square yard was applied, and the aggregate immediately mixed with two A-frame spike harrows, one drawn by a Caterpillar Thirty-Five gasoline tractor, the other by a Caterpillar Fifty diesel tractor. Each harrow was drawn through the aggregate from four to six times for thorough mixing. After the retread was thoroughly mixed, its surface was shaped by an Adams multiple-blade maintainer.

To finish off the day's work on any portion of the retread construction, the bituminous-coated aggregate was rolled once with a Huber 5-ton roller, equipped with a field-constructed water system to dampen the roller wheels and prevent bituminous material from sticking to them.

In general, the retread was given three complete rollings by two 10-ton Hubers equipped with similar water systems, lapping the large wheel about one third its width on each trip over the new surface.

Then additional asphalt, 0.25-gallon per square yard, was added as a penetration application, and the rolling continued until the No. 2 stone was shaped, keyed, and compacted as much as possible without any great portion of the stone being crushed.

One of the Two Distributors, Constructed in the Contractor's Shop, Which Were Used on the Ralph Rogers Co. Retread Contract

Final Operations

The next operation was checking with a 10-foot straight-edge, laid parallel with the roadway and lapping the straight-edge one half its length each time it was moved along. All variations of ¼-inch or more located by the straight-edge were removed by patching with pre-coated No. 8 stone, from ¾-inch down to 8-mesh, and the patches

(Continued on page 34)

TAR KETTLES
Fire Proof—Oil Burning
Hand and Motor driven spray. Many sizes. Write for catalog.
White Mfg. Co.
ELKHART INDIANA

ON THE WIDEST VARIETY OF SUMMER AND WINTER WORK

No matter what the job—Subgrading, Scarifying, Oil Mix, Light Ditching, Shouldering, Bulldozing, Snow Plowing, or General Maintenance—the "77" provides extra performance features that insure best results and lowest operating cost . . . power, speed, and control when you need it and as you need it.

Quick-acting, accurate hydraulic controls give fast, safe adjustment to varying ground conditions. Blade is held in absolute control at all times by ingenious combination of long wheelbase, wide front axle with leaning wheels, a large diameter circle, Dual (8-tire) Drive, positive hydraulic controls, and a unique anti-chatter device. Side draft is eliminated. You get a full cut every trip. And a six speed transmission gives you just the right speed for each job at an economical r.p.m.

Learn exactly what the "77" can do for you . . . how it will pay big returns on your investment during the entire year. Mail coupon for complete details.

OUTPERFORMS AS A BULLDOZER TOO

The Austin-Western "77" can be equipped as a bulldozer with splendid success. The powerful motor and efficient drive allow the operator to do heavy work under most difficult conditions. Users are constantly finding new ways to use their "77's". It is a money-maker for anyone who builds or maintains roads.

THE AUSTIN-WESTERN ROAD MACHINERY CO.
AURORA, ILLINOIS

Austin-Western

The Austin-Western Road Machinery Co., Y, Aurora, Ill.
☐ Send a salesman
Tell me more about the
☐ Motor Grader
☐ Roll-A-Plane
☐ Blade Grader
☐ Motor Sweeper
☐ Crushing & Washing Plants
☐ Elevating Graders
☐ 8-Yd. Scraper
☐ 12-Yd. Scraper
☐ Trail Cars
☐ Shovels and Cranes
☐ Bituminous Distributors
☐ Snow Plows
MG-706R
Name.....
Address.....
City.....State.....

100 PER CENT TRACTION

DYNAMITE ON WHEELS

FOUR POINT POSITIVE DRIVE

THE WALTER SNOW FIGHTER, the snow-battling vehicle that has earned for itself the title of DYNAMITE ON WHEELS by reason of its performance under severe conditions in all sections of the United States and Canada, gives the user more than just four-wheel drive in plowing through mountainous heaps of snow—without faltering or halting.

A WALTER MOTOR TRUCK is more than a four-wheel drive truck; it is a Four-Point Positive-Drive Truck. A four-wheel drive truck, in hard going, can and must slip two wheels while the other two stand still—RESULT—50% Traction. A WALTER TRUCK is equipped with three automatic locking differentials, which does not permit one, two or three wheels to spin or slip while the others stand still—RESULT—100% Traction at all times under any and all conditions.

GENERAL USE

A WALTER SNOW FIGHTER not only sees service in the winter. The plow can be removed from the truck and the unit can be used for general service. WALTER MOTOR TRUCKS are used in the oil fields of Texas and Oklahoma, for logging on the Pacific coast, and for general transportation at a low operating cost per mile. WALTER TRUCKS are good in any soft going. They always assure the user of the delivery of his cargo.

Walter Motor Truck Company

1001-19 IRVING AVE.
RIDGEWOOD, QUEENS, L. I., N. Y.

The Koehring 403 Shovel

Selective Swing Speed Feature of 403 Shovel

High-speed operation with surplus power is the basic design idea of Koehring excavating equipment and is one of the important features of the Koehring 403 shovel. Another feature of this unit is its selective swing speed. Two fast swing speeds are available, to suit best the operating conditions and increase the number of dipper or bucket loads per hour. The normal high-speed swing is further increased to reduce the unproductive time loss when swinging, accomplished by a simple gear shift without increasing the motor speed.

To increase further the efficiency of this unit, the 403 has anti-friction bearings and enclosed gears running in oil, reducing delays to a minimum and increasing normal high-speed operation. All machinery shafts which enter into the operations of hoisting, drag, dipper crowd or racking-in, boom hoist and swing are roller or ball-bearing mounted, sealed against dust and dirt in enclosed gear cases.

Model 403 is fully convertible to dragline, crane, trench-hoe, as well as for pile-driving operations. As a shovel, it is equipped with a 1-yard dipper, while its capacity as a clamshell or dragline is 1½ yards and as a crane, 16 tons.

Complete details and specifications of this 403 shovel are contained in literature which those interested may secure direct from the Koehring Co., 3026 West Concordia Ave., Milwaukee, Wis.

International Harvester Managerial Promotions

Three managerial promotions in the sales department of International Harvester Co., 606 So. Michigan Ave., Chicago, Ill., have been announced. They are the appointment of J. L. McCaffrey, former manager of domestic sales, as director of domestic and Canadian sales; the appointment of W. F. McAfee, former manager of domestic motor truck sales, to succeed Mr. McCaffrey as manager of domestic sales; and appointment of P. V. Moulder, former assistant manager of the Eastern district, to succeed Mr. McAfee as manager of domestic motor truck sales.

CONCRETE VIBRATORS

Air operated vibrators for all classes of concrete construction including bridge deck slabs, dams and locks.

Portable Vibrating Screed Boards for highway pavements.

Special steam operated vibrators for placing hot asphalt mixtures.

Write for circulars and engineering data

RENTALS SALES

MUNSELL CONCRETE VIBRATORS

907 West Side Ave. Jersey City, N. J.

Waterproofing and Joints of Rubber Plastics

Rubber Associates, Inc., 342 Madison Ave., New York City, will engage in the manufacture and sale of a new series of compounds, plastic and elastic in character, to improve on present practices of sealing or waterproofing expansion and contraction joints. These substances developed have tenacious bonding properties with resistance to the elements that cause disintegration of many of the substances now in common use.

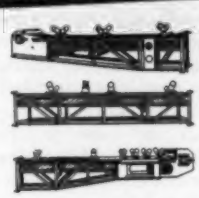
The organization is composed of S. P. Tauber, M. R. Buffington, Consultant on Rubber Materials, H. R. Van Deventer, Patent Expert and a well known Engineering Consultant on application methods and construction practices. S. P. Tauber reports that a complete study of the requirements for present construction projects indicates the need of better materials that will require less maintenance, which in turn will warrant additional initial cost.

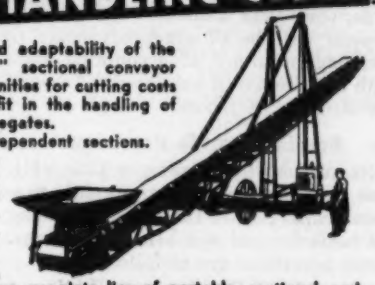
300 Miles of Bridges

A two-year highway building program beginning July 1, 1937, the largest in the history of the country, has been authorized by Congress. This can exceed $800,000,000 if the states make full use of their possibilities and match all that the Federal Government has offered.

During the years 1934 and 1935, over 200 miles of bridges were built. If the same ratios are maintained, according to *The Steel Constructor*, with the larger appropriations something not far short of 300 miles of bridges should be constructed in the next two years.

NEW WAYS TO CUT MATERIALS HANDLING COSTS





The flexibility and adaptability of the Porta "Model 347" sectional conveyor offers wide opportunities for cutting costs and increasing profit in the handling of concrete and aggregates.

Made up of independent sections. Can be used on wheel truck, caster mounting or on supports as permanent or semi-permanent conveyor.

Easily disassembled, easily transported, easily reassembled. Our catalog describes our complete line of portable, sectional, and permanent conveyors designed to suit every contractor's requirement.

PORTABLE MACHINERY CO., York, Pa.; Clifton, N. J.; Chicago, Ill.

BLAW-KNOX Self-Aligning ROAD FORMS

STEEL STREET FORMS

BATCHERPLANTS

BULK CEMENT PLANTS

TRUCK MIXERS

ROAD FINISHERS

CLAMSHELL BUCKETS

The Self-Aligning feature alone makes this new **Blaw-Knox ROAD FORM** *a good buy for any Contractor*

● This new design of Road Form, which has been thoroughly proved in service, permits rapid form setting, always true to line and grade regardless of whether the steel stakes become bent or forced off plumb in stony ground.

Blaw-Knox Bulletin No. 1557 will show you how the improved design of buttress braces makes this new Road Form inherently stronger and more durable to take the shocks of modern paving operations. *Send for your copy.*

also: WEIGHING BATCHERS for Aggregates and Cement ... CENTRAL MIXING PLANTS ... TRUCK MIXER LOADING PLANTS ... STEEL FORMS for General Concrete Construction ... CONCRETE BUCKETS ... BOTTOMLESS SCRAPERS ... SHEEPSFOOT TAMPING ROLLERS

BLAW-KNOX COMPANY

2087 FARMER'S BANK BUILDING PITTSBURGH, PA.

Offices and Representatives in Principal Cities

Tax Records

(Continued from page 22)

scribe exactly what must be shown by the records. Beyond this the employer is free to keep such records as will indicate to the tax authority whether the tax is properly computed and paid.

It is clear that in designing the records, competent assistance by qualified experts will be of great advantage in assuring accuracy of accounting facts with a minimum of handling and cost of maintenance of records.

Special Records Provisions

Regulations 91, relating to Title VIII, also contains important special provisions applying to the records forming the basis for old age benefit exactions. These provisions are as follows:

"Records of Employees.—While not mandatory, it is advisable for each employee, beginning January 1, 1937, to keep permanent accurate records showing the name of each employer for whom he performs services as an employee, the dates of beginning and termination of such services, and the information with respect to himself which is required by subdivision (a) of this article to be kept by employers.

"Copies of Returns, Schedules, and Statements.—Every employer who is required, by these regulations or by instructions on any form prescribed under these regulations, to keep any copy of any return, schedule, statement, or other document, shall keep such copy as a part of his records.

"Records of Overpayments.—Every person claiming refund or credit of any overpayment of tax, penalty, or interest shall keep a complete and detailed record of the overpayment.

"Place and Period for Keeping Records.—All records required by these regulations shall be kept, by the person required to keep them, at some convenient and safe location accessible to internal revenue officers. Such records shall at all times be open for inspection by such officers. Records required by subdivisions (a) and (c) of this article shall be maintained for a period of at least four years after the date the tax to which they relate becomes due, or the date the tax is paid, whichever is the later. Records required by subdivision (d) of this article, including records required by subdivisions (a) and (c), relating to a claim shall be maintained for a period of at least four years after the date the claim is filed."

Accounting and Records

It is provided in the Federal Act that the provisions relating to penalties applicable to any tax imposed by Section 600 or Section 800 of the Revenue Act of 1926, and the provisions of Section 607 of the Revenue Act of 1934, shall, insofar as applicable and not inconsistent with the provisions of Title VIII, be applicable to taxes imposed by Title VIII.

These provisions imposing penalties under the Revenue Act of 1926 embrace the following Sec. 1102 (a) and Sec. 114 (a) and (b):

"Every person liable to any tax imposed by this Act, or for the collection thereof, shall keep such records, render under oath such statements, make such returns, and comply with such rules and regulations, as the Commissioner, with the approval of the Secretary, may from time to time prescribe. *****

"Any person required under this Act to pay any tax or required by law or regulations made under authority thereof to make a return, keep any records, or supply any information, for the purpose of the computation, assessment, or collection of any tax imposed by this Act, who willfully fails to pay such tax, make such return, keep such records, or supply such information, at the time or times required by law or regulations, shall in addition to other penalties provided by law, be guilty of a misdemeanor and, upon conviction thereof, be fined not more than $10,000, or imprisoned for not more than one year, or both, together with the cost of prosecution.

"Any person required under this Act to collect, account for and pay over any tax imposed by this Act, who willfully fails to collect or truthfully account for and pay over such tax, and any person who willfully attempts in any manner to evade or defeat any tax imposed by this Act or the payment thereof, shall, in addition to other penalties provided by law, be guilty of a felony and, upon conviction thereof, be fined not more than $10,000 or imprisoned for not more than five years, or both, together with the costs of prosecution."

Records Under Title IX

In view of the fact that Title IX has been in effect during 1936, practically all employing taxpayers during that period have necessarily given attention to the matter of records required for this tax.

The official Federal regulations read as follows:

"Art. 2 (a) Every person subject to tax under the Act shall, during the calendar year 1936 or any calendar year thereafter, for each such calendar year, keep such permanent records as are necessary to establish:

(1) The total amount of remuneration payable to his employees in cash or in a medium other than cash, showing separately, (a) total remuneration payable with respect to services excepted by section 907 (c), (b) total remuneration payable with respect to services performed outside of the United States, (c) total remuneration payable with respect to all other services.

"(2) The amount of contributions with respect to employment during the calendar year paid by him into any State unemployment fund, showing separately, (a) payments made and not deducted (or deductible) from the remuneration of employees, (b) payments made and deducted (or deductible) from the remuneration of employees, (c) payments made with respect to services excepted by section 907 (c).

"(3) Such other information as will

(Continued on following page)

COMPLETE
WELL POINT SYSTEMS
WILL DRY UP ANY EXCAVATION
Faster—More Economically
Write for Job Estimate and Literature
COMPLETE
MACHINERY & EQUIPMENT CO., Inc.
Dept. C
38-40 11th St., Long Island City, N. Y.
Tel. IRonsides 6-8600

NEW TRUCKS CUT NATION'S HAULING COSTS

HYDRAULIC BRAKES
"We're Saving $8 A Month on Gas..."
"Am I glad we switched to this new 1937 Dodge truck! I'm the driver of it; I know those finer Dodge features are saving us plenty on gas, oil and tires...I've made a careful check-up and we're saving $8 a month on gasoline alone."—H. J. Smith, Vapofier Corporation, Chicago, Ill.
H. J. SMITH
"Trucks Earn My Living for Me...That's Why I Switched to Dodge"
"I have compared Dodge with other lowest-priced trucks, because I am interested in both long life and low upkeep. Although Dodge trucks cost virtually the same as other low-priced trucks, they are worth considerably more because Dodge gives you hydraulic brakes, full-floating rear axle, and special gas and oil saving features. On gas alone, my Dodge trucks will save me five to seven dollars apiece every month."—C. E. Moore, Buda, Texas.
C. E. MOORE
ONE PIECE AXLE HOUSING
SAFETY STEEL CAB
6-CYLINDER L-HEAD ENGINE
SIX GAS AND OIL SAVING FEATURES

NEW 1937 DODGE ½-1 TON EXPRESS—6-CYL.—Offered on 120" chassis with 84" body and 136" chassis with 108" body. Has all the gas, oil and tire saving features and long-life construction that make Dodge world-famous.

NEW 1937 DODGE 1½-TON DUMP—6-CYL.—125½" W.B.—Priced with the lowest...and what a value! Built to stand up under months and years of hard service. Will haul maximum loads at lowest cost per mile for gas, oil, tires, upkeep.

NO WONDER truck operators everywhere are *switching* to new 1937 Dodge trucks. Dodge is priced with the lowest... but gives you many extra high-priced truck features that save money on gas—oil—tires—upkeep! Owners report "saving up to $95 a year on gasoline alone!" And with these great economy advancements, Dodge gives you more power...real 1937 styling...newly designed cabs and bodies to increase safety and driver comfort. See your Dodge dealer. Get all the facts about this great new money-saving Dodge before you buy any truck... get a "Show-Down" score card showing features of all three lowest-priced trucks. See how Dodge excels! Make the FREE gas test. Learn how Dodge trucks will save you money!

LOW DOWN PAYMENTS...LOW MONTHLY TERMS. Consult your Dodge dealer. You'll find that easy terms can be arranged to fit your budget, at low cost, through Commercial Credit Company.

DODGE—Division of Chrysler Corporation

DODGE TRUCKS PRICED WITH THE LOWEST BUILT TO OUTLAST THEM ALL

Tax Records

(Continued from preceding page)

enable the Commissioner to determine whether such person is subject to the tax, and if subject to the tax, the amount thereof.

"Art. 2 (b) No particular method of accounting or form of record is prescribed. Each person may adopt such records and such method of accounting as may best meet the requirements of his own business, provided that they clearly and accurately show the information required above, and enable him to make a proper return on the prescribed form.

"(c) Records are not required to show the number of individuals employed on any day, but must show the total amount of remuneration actually paid during each calendar month and the number of individuals employed during each calendar month or during each such lesser period as the employer may elect.

"(d) Any person who employs individuals during any calendar year but who considers that he is not an employer subject to the tax should be prepared to establish by proper records (including, where necessary, records of the number of persons employed each day) that he is not an employer subject to the tax.

"Art. 3. All records required by these regulations shall be kept safe and readily accessible at the principal place of business of the person required to keep such records, or at such other place or places as the Commissioner, upon written application by the person concerned, may approve. Such records shall at all times be open for inspection by internal revenue officers, and shall be preserved for a period of at least four years from the due date of the tax for the calendar year to which they relate."

Records Under State Laws

In view of the differences between the provisions of the Federal Social Security Act and the state payroll tax laws, it is important that the taxpayers' records should contain information required by both federal and state laws and regulations. For example, under the New York State law it has been provided:

"Each employer covered by the New York State Unemployment Insurance Law shall keep on his employment and payroll records, with respect to each individual insured employee, beginning January 1, 1936, the following items: (a) Insured employee's name; (b) Wages earned during payroll period; (c) Number of days worked during payroll period; (d) Total number of hours worked during payroll period; (e) Full scheduled hours per week for employees or group of employees; (f) Date when employee quits or is "laid-off," either permanently or temporarily, or is discharged; (g) Date employee is hired or reinstated after "lay-off" or is rehired; (h) Place of employment (city or town).

"Note 1: Space should be reserved on the employer's records for employee's insurance number, which will probably be issued for New York State Unemployment Insurance Identification and possibly for Federal Social Security Legislation.

"Note 2: Provision should be made by employers for totaling above items (a), (b), (c) and (d)."

In the official interpretations prepared by the Division of Placement and Unemployment Insurance under the New York Unemployment Insurance Law, a number of points relating to employers' records, reports and contributions have been covered.

For example, an employer whose present payroll period does not coincide with the calendar week need not change his payroll practice. The administration does not require payroll records to be kept for calendar weeks or similarly determined periods. Record keeping may be based on any period.

An employer may provide for different payroll periods for different groups of employees. Employers may pay different groups of employees at different intervals, and keep the records correspondingly. If payroll periods overlap the calendar year, employers should pro-rate payrolls on the basis of the number of working days in each year for the payroll period in question, and pay contributions accordingly.

Employers operating at various places within the State of New York may keep consolidated records, or each plant may keep its own records, in accordance with the convenience or preference of the employer. This applies to parent and subsidiary companies.

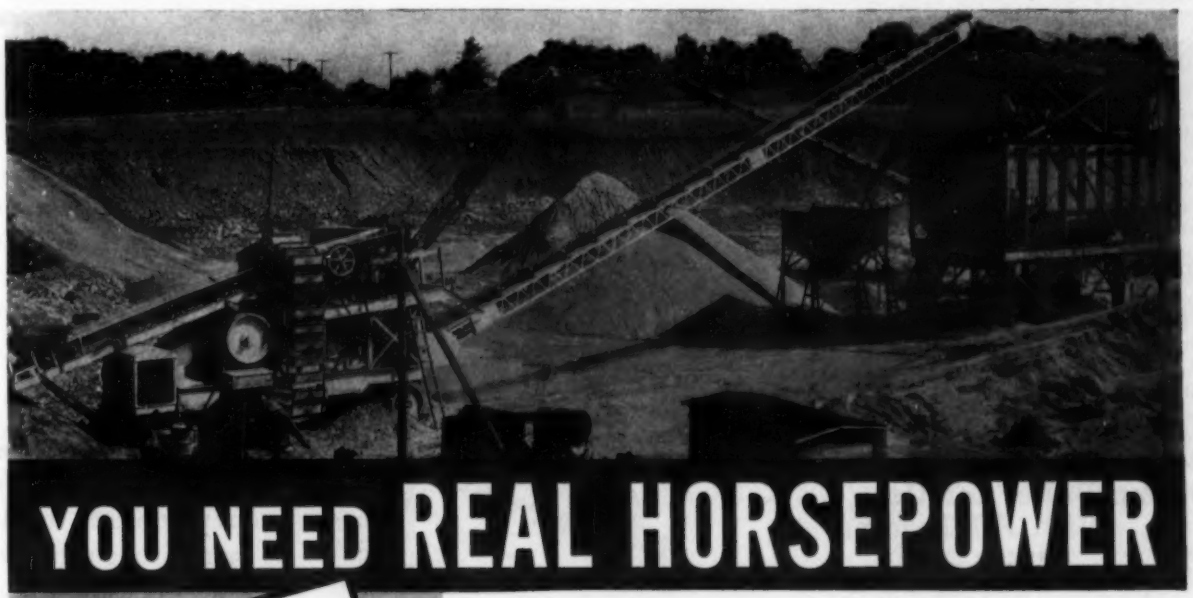
In the event that an employer taxpayer keeps all of the accounting and payroll records at an office outside of the State of New York, such a taxpayer is not required to change the system. However, for auditing purposes the taxpayer should be prepared to have copies of its records covering New York employees, available upon demand, at an office located within New York State.

It is not required that employers keep cumulative records, if they submit the required data to the Division of Unemployment Insurance currently.

No uniform payroll forms will be supplied by the Division of Unemployment Insurance. If an employer so desires, he may adapt to his own requirements the payroll forms suggested by the Division, and may use this adapted form for reporting employee data when requested.

It is not necessary to transfer the in-

(Continued on page 44)



● The engine that drives gravel plant machinery must have *real* horsepower. The horsepower shown on some performance curve won't turn over a single piece of equipment, if it isn't in the engine.

In the Hartland-Verona Gravel Co. operation at Verona, Wis., the power for driving all equipment is generated in the crushing plant. A 6-cyl., 125-185 hp. EKU Waukesha-Hesselman Oil Engine drives the crushing plant machinery direct, while, at the same time, the washing plant screens and two pit conveyors are driven by motors which receive their current from a 40 kv-a generator, also driven by the engine.

The Hesselman Engine has a sheave for 13 V-belts on its shaft. Nine of them connect to the driving mechanism of the primary crusher, three drive the generator and one the exciter. A system of chains and sprockets from the primary crusher drives the secondary crusher, return bucket, vibrating screen, conveyor over the screen and washing plant conveyor, from its tail pulley. The rest of the mechanical equipment, except the pump, is motor driven.

This Waukesha-Hesselman Engine is operating on No. 2 fuel oil, burning an average of 9 gal. per hour. A low compression, solid injection oil engine, with precisely timed electric ignition, the Waukesha-Hesselman Engine burns "modern high speed diesel fuels" with high efficiency; yet weighs no more than, and starts as easily as, a gasoline engine. Real horsepower . . . not paper horsepower. Write for Bulletin No. 1010.

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN

MORE CONCRETE
BETTER MIXED
LESS OPERATING COST
LOWER MAINTENANCE
LONGER LIFE
Get the facts before you buy
WRITE TO
RANSOME CONCRETE MACHINERY CO.
DUNELLEN, N. J.

PAVERS
by
Ransome

SINCE
1850

A Portion of the Retread Construction Ready for the First Application of Asphalt

Retread Methods Used On New Indiana Road

(Continued from page 29)

rolled to conform with the surrounding surface.

After patching was completed, 25 pounds per square yard of covering aggregate, size No. 8, was placed and broomed into the voids of the No. 2 stone by a 16 x 8-foot drag broom. When the voids were all filled and the aggregate uniformly distributed, 0.35-gallon per square yard of RC-3 asphalt was applied, following which all aggregate in excess of that required to fill the voids was mixed and shaped with the Adams multiple-blade maintainer.

As soon as the covering aggregate was shaped, rolling was continued until the retread was thoroughly compacted and the surface was again straightedged to locate any irregularities of ¼-inch or over which might have developed during the shaping and rolling of the covering aggregate. Any irregularities located were patched and rolled as before to conform with the surrounding surface. Upon the surface thus prepared, 10 pounds per square yard of No. 11 sealing aggregate, from ⅜-inch to 8-mesh in size, was placed to fill the voids remaining in the covering aggregate. This stone was uniformly distributed as before with a 16 x 8-foot drag broom. When this stone was uniformly placed, 0.2-gallon per square yard of RC-3 asphalt was added as a final application.

Rolling with the two 10-ton Hubers followed this application of the asphalt and continued until the No. 11 aggregate thoroughly sealed the surface.

Labor

Four men operated the two distributors applying the prime to the base and one man operated the A-C tractor. For the placing, mixing and rolling, there were two foremen, ten skilled workers to operate the rollers, tractors, distributors and the Adnun paver, and twelve common laborers for placing the earth wedge and other jobs incidental to this construction.

All common labor and part of the skilled labor worked in half-day shifts, forenoon and afternoon, approximately 6 hours per shift. The remaining skilled labor was given permission to work longer hours per day.

Unloading Aggregate from a Truck Into the Adnun Paver Which Placed the Aggregate on the Road

Personnel

This 4.854-mile contract east of Bloomington was awarded to the Ralph Rogers Co., of Bloomington, Ind., for whom Harry L. Barry, one of the partners, was in charge. The author was in charge of the work for the State Highway Commission of Indiana.

Stump Puller for Use With All Tractors

The Dorsey Model B stump puller, made by Dorsey Bros., Elba, Ala., is now adaptable to all makes of tractors. This new Model B machine has a flexible shaft drive, the features of former models which had proved desirable, and added features of operation and adaptability to all types and sizes of tractors, either wheel or crawler. The flexible shaft connects to the rear power take-off on the tractor and only a few seconds are required to attach or detach, which is accomplished by removing the drawbar pin. It is of all-steel construction, rigidly designed to develop more than 50 tons direct-line pull. Anchor hooks to which the anchor cable is attached are provided on the machine so that there is no resistance whatever on the tractor, regardless of the line pull being developed.

When attached for operation, the stump puller may be traveled over any ground conditions. Complete information on these Model B stump pullers is contained in new literature which may be secured direct from the manufacturer.

CUMMER
ASPHALT PLANTS
Two-Fire Dryer-Cooler
For Either Hot or Cold Mix
No Silos Required
LARGE CAPACITY PORTABLE PLANTS WITH 1 TON, 1½ TON OR 2 TON MIXER
Electrical or Mechanical Time Lock to Meet Any State Specifications
The F. D. Cummer & Son Co.
17th and Euclid CLEVELAND, OHIO

Thirty Years Young!

THIS month—March 4th, to be exact—marks the 30th year since the incorporation of The Cleveland Rock Drill Company. Since the early days of the hammer drill, Cleveland has labored unceasingly in the design and improvement of the products we manufacture. The degree of success attained is indicated by our enormous increase in business volume.

To you, our friends, users of Cleveland Rock Drills throughout the U. S. A., and in all parts of the world, we extend thanks for your confidence, for your orders and repeat orders that have heartened and encouraged us even through the depression years. We promise a continuance of the high quality and faithful service that have come to be synonymous with the Cleveland name.

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Negaunee, Mich. 223 Heath Street.
Newton, Mass., 457 Washington St.
New York, N. Y., 200 Church Street.
Richmond, Va., 12 North 18th St.
Salt Lake City, Utah, 801 Dooly Bldg.

THE CLEVELAND ROCK DRILL COMPANY
3734 EAST 78TH STREET • CLEVELAND, OHIO
Cable Address: ROCKDRILL

LEADERS IN DRILLING EQUIPMENT

The Isaacson Skraper-Karrier

New Hydraulic Scraper Designed in Northwest

The Isaacson Skraper-Karrier, recently developed by the Isaacson Iron Works, 2917 E. Marginal Way, Seattle, Wash., is hydraulically powered by a roller bearing gear pump. The tractor driver has control of two levers, one governing the dig-lift-spread action of the machine, and the other swinging the carrying gate to enclose the load and later dump it for spreading. The unit has demountable Budd disc wheels, pneumatic-tired, with Timken bearing-equipped hubs.

The design of the bowl is unusual, having a tool steel cutting edge at the rear. A full load is rolled up to be taken up by the carrying gate that sweeps under the dirt and lifts it clear for hauling. The cutting edge does not swing in an arc but merely digs and scrapes. The double-acting carrying gate secures and carries the load. Instant and positive control of digging and spreading makes possible variable scraping depths and leveled distribution to produce smooth surfacing on irregular terrain.

The HK series of Skraper-Karriers includes four sizes for tractors of 40, 50, 65, and 80 hp and up. The capacities of these models range from 6 to 12 cubic yards. The cutting depth is up to 8 inches in all models and the spreading depth from 0 to 14 inches.

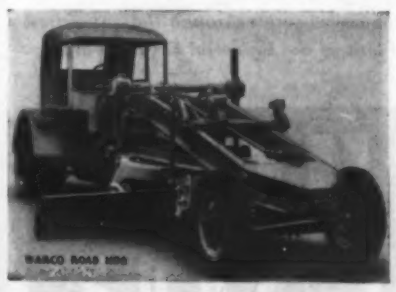
Complete specifications of these units are contained in literature which may be secured direct from the manufacturer by mentioning this magazine.

Drive on Eight Wheels For New Power Grader

The new rear control Warco Model 33 power grader announced by W. A. Riddell Corp., Bucyrus, Ohio, is built on a 10-inch, 30-pound channel frame with five cross braces welded to form a single rigid unit. A wide front axle, long blade base, large diameter circle, belt-driven power control and reinforced moldboard are among its features.

All controls for the operation of the machine are conveniently placed within the reach of the operator, who is seated in a side entrance cab of standard design equipped with curtains or glass windows and side doors if desired. The power plant of this new Road-Hog may be either an International Model I-30, a J. I. Case Model LI, or an Oliver Hart-Parr 28-44 gasoline tractor or a diesel engine.

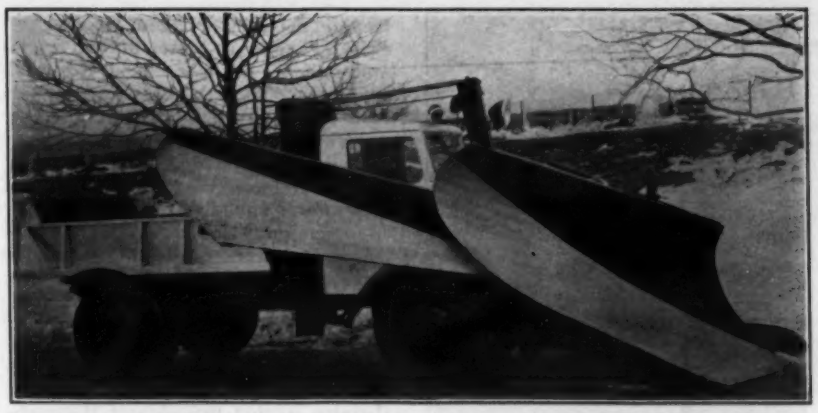
The oscillating traction unit which drives the eight wheels of the Warco Model 33 is not a dual wheel tandem drive but actually drives on all eight wheels. The extension wheels are not bolted to the other driven wheels but are separately motivated. This unit is offered with a choice of traction equipment; either the Octopus 8-wheel drive, single drive dual-tired rear wheels, steel rear crawlers, or the Octopus tandem 4-wheel drive with 12.75 x 24 low pressure lug-type tires.



The Warco Grader with Diesel Power

Additional equipment which this unit will carry includes the new Warco V-type snow plow with a heavy push frame rigidly reinforced by angles and braces electrically welded to the moldboard or wings. In working position the plow rides on shoes with renewable chilled shoes. The heavy 1 x 6-inch push bars are attached to the front of the grader at the widest point of the head giving a wide distribution of the pushing stress and minimizing possible side thrust. The moldboard is 8-gage steel 37½ inches high at the front and 49½ inches high at the rear with a wing spread of 10 feet and a clearing width of 9 feet 1½ inches. A scarifier-lifting mechanism is used to manipulate the plow.

The new Model 33 has an independent scarifier which will root, dig and break up old roadway. The lifting mechanism is fully enclosed and the lift link has ball and socket joints. The scarifier heads are one-piece cast steel with 1 x 3½-inch teeth double pointed and self sharpening held in place by a special steel bar which prevents binding. Scarifiers with 11 teeth cut a 41½-inch swath or 15 teeth cut a 58-inch swath.



The Walter Snow Fighter with Four-Point Positive Drive Used by State, County and Town Highway Departments As Well as by Private Business Firms and Bus Corporations

TELSMITH AT THE
GRAND COULEE DAM

A SECOND No. 20 TELSMITH PRIMARY BREAKER HAS JUST BEEN ORDERED

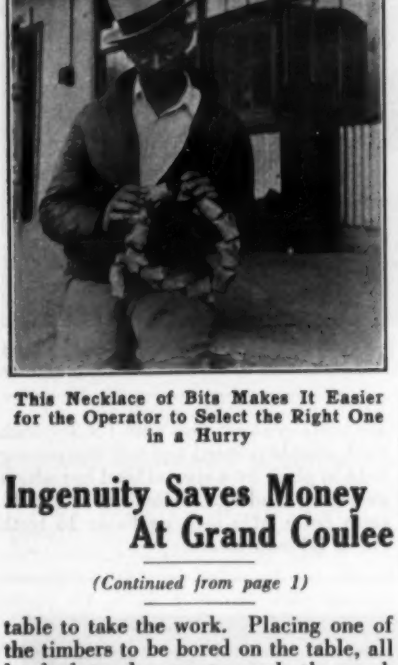
In the million dollar aggregate plant of the M-W-A-K Co. at Grand Coulee Dam, a Telsmith Primary Breaker has been crushing all the oversize from the Brett pit—big, hard, 6 to 20 inch boulders. Operating to capacity for many months, it has set a remarkably successful record for both quantity and quality of output.

Development of the pit has shown the presence of more rock than anticipated. To further increase the production of aggregate, a second No. 20 Telsmith Primar Breakery has now been ordered; and will be installed next to the original crusher.

The short, compact structure, *steel* frame and *steel* crown give Telsmith super-stamina. Larger head and concave diameters, with greater receiving and crushing area, allow faster feeding. The unique *parallel pinch* guarantees bigger capacity. That's why Telsmith is the outstanding performer on hard rock—such a satisfactory equipment at Grand Coulee. Bulletin B-34 gives complete details. Write for it today.

BC-1-37

TELSMITH



This Necklace of Bits Makes It Easier for the Operator to Select the Right One in a Hurry

Ingenuity Saves Money At Grand Coulee

(Continued from page 1)

table to take the work. Placing one of the timbers to be bored on the table, all he had to do was to push the work against the bit and the hole was drilled in a few seconds with a minimum of effort.

Use Impact Wrench on She-Bolts

An application somewhat similar to the above was noticed down where concrete was being poured in the forms. She-bolts are used to hold the forms in place. In the hollow end of the bolt is a female thread, to screw onto the tie rod. To turn the she-bolt up on the tie rod, there is a nut screwed onto the other end and then welded fast. Inward from the welded nut, and on the same thread, is a traveling nut, which is for tightening up on the form and for loosening when the form is taken down.

In throwing these she-bolts around on the job, the threads are often injured so that the traveling nut can not be readily turned. A die can not be put on the thread to clean it out as the welded nut is in the way. So they put the traveling nut in a vise on the bench. The Pott impact wrench, held horizontally, is then applied to the welded nut and the compressed air motor of the wrench started. This turns the bolt rapidly in the traveling nut, which can no longer travel, and the latter, acting as a die, clears the thread.

A Necklace of Jackbits

Roy E. MacFarland, Sales Engineer for the Ingersoll-Rand Co., Butte, Mont., office, spends a large part of his time at Grand Coulee. In this observation tour, the photographer came upon MacFarland with an odd-looking necklace, shown in the illustration. The beads are not the teeth of prehistoric animals, although plenty of such remains have been unearthed in the excavations. They turned out to be Jackbits for drills. To make it easy for the operators to pick out the right bit, they are strung on a wire ring, as shown, in complete sets from 1⅞-inch up to 2¾-inch, in ⅛-inch changes. The bits are graduated on the ring in order of size.

Mixers Powered by Pneumatic Drills

From November, 1935, to September 1, 1936, 135,000 sacks of grout were mixed and pumped into the various types of grouting holes under the dam. This grout was all mixed in a grouting plant containing four mixers with their attendant agitators. The grout is pure cement mixed with water and must be kept agitated before passing into the pumps.

The M-W-A-K Co. designed and built its own grout mixers and agitators which, roughly speaking, are simply tanks, with paddles for mixing, and smaller, vertical tanks with a cone and vane inside, in the case of the agitators. The mixers have a capacity of 14 cubic feet and the agitators about 10 cubic feet each. The motive power in each case is nothing more nor less than an Ingersoll-Rand Type ASE pneumatic drill so mounted as to turn the shaft of the mixer or agitator as the case may be. They are all individual drives.

In the eleven months, only one of these power units had to come down for any attention. The largest single run of the four mixers combined was 3,470 sacks of grout in a single 8-hour shift.

Putting an "Edge" on Cement Augers

The augers or screws used in unloading cement are about 6 inches in diameter and turn in a pipe. Cement is highly abrasive so that the edge of the screw must be very hard and is, therefore, faced with Stellite. Otherwise it would soon wear so as not to fit the pipe accurately, and the cement might squirt back, as in the old-fashioned sausage grinder when it backfires.

In the machine shop, one of these augers was being trued up on a lathe. C. Rouner, shop foreman, explained that to operate the grinding wheel against the edge of the screw, no fancy lathe attachment was necessary. The machinist simply takes an Ingersoll-Rand Multivane grinder and mounts it on a tool adapter and so adjusts it that the wheel barely contacts the edge of the screw, as the latter is slowly revolved in the lathe. This dresses the edge down accurately. Alexite 36-1-32 wheels are used, 6 inches

(Continued on page 45)

Mall TRADE MARK
CONCRETE VIBRATORS
A Type and Size for EVERY *Job!*
GAS ENGINE — AIR — ELECTRIC
Furnish us with full particulars of your contract and we will gladly recommend and quote prices on the unit best suited for your work.
MALL TOOL COMPANY 7743 South Chicago Avenue Chicago, Illinois
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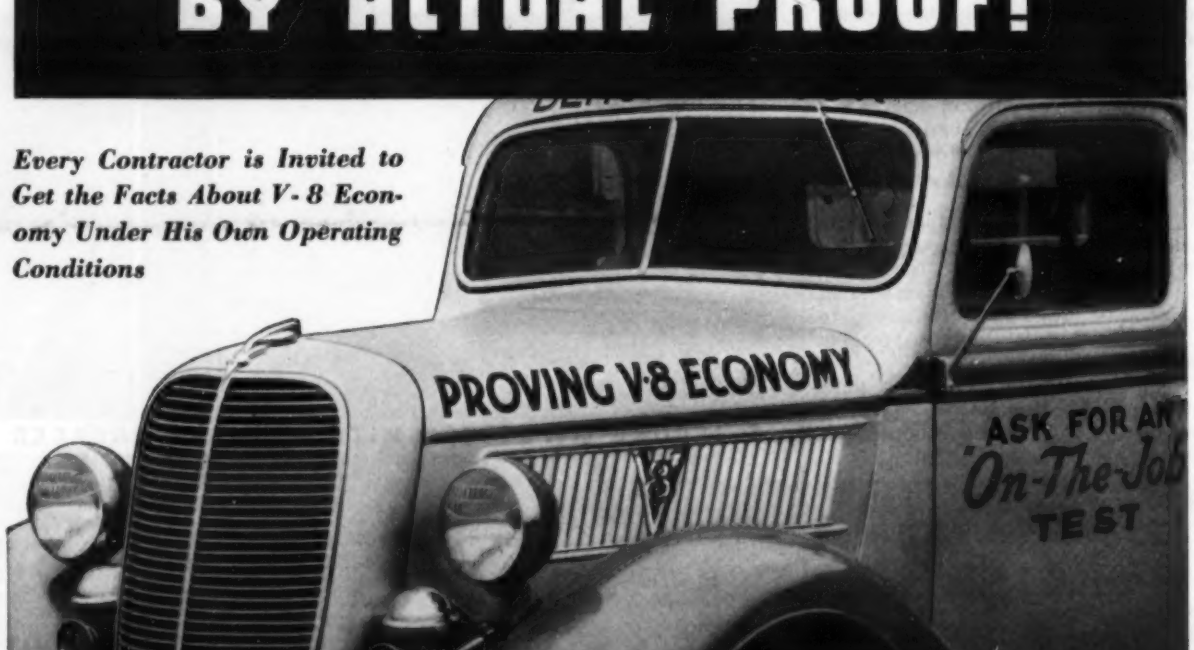
WINNING NEW OWNERS BY ACTUAL PROOF!

Every Contractor is Invited to Get the Facts About V-8 Economy Under His Own Operating Conditions



WHEN you buy your next truck, what will you want to know . . . what it IS . . . or what it DOES? In either case, your Ford dealer is prepared to PROVE the outstanding advantages of Ford V-8 Trucks and Commercial Cars.

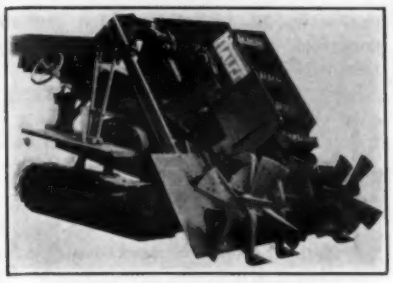
If you are interested in mechanical detail, your Ford dealer can give you the facts about any part . . . and tell you its effect on power, speed, economy, reliability, safety, comfort and appearance. And if you are interested in RESULTS, he will be glad to let you make your performance and economy tests under your own operating conditions.

This year, every type in the Ford V-8 Truck and Commercial Car line is available with an 85-horsepower engine improved to give new economy on heavy-duty and high-speed operations. And types commonly used for light delivery work are also available with a new 60-horsepower V-8 that is setting new records for high gasoline mileage. Ask your Ford dealer to demonstrate the engine best suited to your individual needs. Call him today and set a date for an "on-the-job" test.

Ford

Convenient, economical terms through the Authorized Ford Finance Plans of the Universal Credit Company.

FORD V-8 TRUCKS AND COMMERCIAL CARS



The New Haiss Tunnel Excavator

New Tunnel Excavator For Soft Rock and Clay

A new excavator for low head room conditions, such as are found in tunnel driving, cutting underpass excavation through railroad embankments, under-trestle digging and the like, has been developed by Geo. Haiss Mfg. Co., Canal Place and E. 142nd St., New York City. The machine capitalizes the high material-handling capacity inherent in the straightline action of a bucket elevator-type machine.

The machine itself is 8 feet overall height by 8 feet extreme width. The digging action centers in the revolving picks and paddles carried on the extended tail shaft. Powered by a large motor, this machine will handle muck, clay, gravel and soft shale and pass 1½ to 1¾ cubic yards of material a minute to the bucket elevator. This in turn discharges onto a short belt conveyor with a 5-foot reach beyond the chassis frame, sufficient to reach to a muck car in tunnel work.

The design of the machine provides for knock-down handling in passing the machine down a shaft for tunnel digging. It will cut a bench up to 48 inches deep and in tunnel work where the bench is 6 feet high workmen can spud down the upper part into the feeding propellers. It will also handle rock up to 6 inches in diameter and when a big rock is encountered or other overload occurs, the machine is protected from breakage by a lugging-type over-load release clutch developed by Haiss.

The machine is electric-motor-driven and self-propelling on creeper treads. It is crowded into the work by a slow-speed worm drive to exert continuous positive pressure. The picks and paddles are of manganese steel as are the buckets. The pick points and the bucket teeth are reversible and renewable.

For work in sticky ground and clay, the machine is provided with a patented bucket clean-out scraper synchronized in action with the passage of the buckets up the elevator so that at the discharge point, several alloy steel fingers reach inside the bucket and mechanically break the film of adhesion between the clay and the bucket. The device swings out of the way when not required. The level of the digging end of the machine can be raised or lowered in relation to the creeper treads while the machine is operating, thus making it simple to hold a grade.

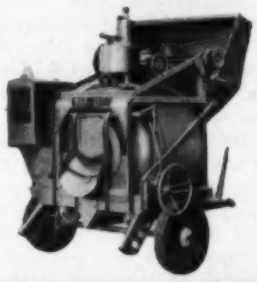
Heavy-Duty Crushers With Roller Bearings

In addition to its complete line of plain bearing jaw crushers and roller-bearing and plain-bearing roll crushers the Iowa Mfg. Co., Cedar Rapids, Iowa, is now marketing a complete line of SKF-bearing-equipped force-feed-type jaw crushers. These new Cedar Rapids roller-bearing crushers are constructed so that field lubrication for the bearings is required only every six months. The bearings are sealed in a new manner to protect them fully at all times from dirt and dust. The bearings and shaft are also larger than is generally used in like sizes, to give greater capacity and longer life with reduced maintenance expense.

The crusher bases and pitmans are of electric cast steel, and shear pins and toggle plates provide the safety features. The crushing chamber is completely lined with manganese and the flywheels are counterbalanced.

Cedar Rapids roller-bearing crushers are available in the following sizes: 10 x 20-inch, 10 x 24-inch, 10 x 36-inch, 15 x 24-inch and 15 x 36-inch. A new bulletin, No. A2, describes the new roller-bearing jaw crusher in detail. It is yours for the asking by mentioning this magazine.

REX 5-S
TWO-WHEEL TRAILER



THE BIGGEST LITTLE MIXER ON THE MARKET

THE ONLY HALF BAGGER WITH—

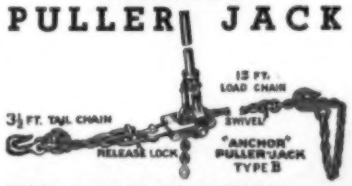
Seven-Second Charge and Discharge . . . Rex Patented Shimmy Skip . . . Accurate Water Control for Pint or Pound Measurement . . . Rex Modern Drum with Patented Mixing Action . . . Husky Motor Mounted "Above the Dirt Line" . . . Faster Spotting on the Job . . . Easier Hi-Speed Towing.

More Yards Per Day — More Jobs Per Year
Send for our 1937 mixer bulletins!

CHAIN BELT COMPANY
1666 West Bruce Street, Milwaukee, Wisconsin

REX CHAIN BELT COMPANY OF MILWAUKEE CONSTRUCTION EQUIPMENT

"ANCHOR" PULLER JACK



THE ONE-MAN OUTFIT OF A THOUSAND USES

The most widely used Pulling-Jack in America. Comes in handy every day. Works in any position. Pulls 6000 lbs. single line; 12,000 lbs. on two line. Pulls anything—concrete forms, piling, lagging. For handling heavy machinery. Joins pipes, belts, conveyors. Stretches cables. For erection, rigging or demolition work, or what have you.

Complete outfit as shown; includes sheave block for changing direction or doubling power. Price $30.00. Net weight 66 lbs. Simple, rugged, powerful, long-lasting. Longer chains if desired.

EDELBLUTE MANUFACTURING CO.
REYNOLDSVILLE, PENNA.

Don't be held up

Wire rope and gear teeth need a lubricant that will not throw off at speed or wash off in rainy weather. Texaco Crater is the answer to this problem.

WHEN the derricks and shovels stop, a job settles down to "slow motion."

Your equipment needn't stop because of wire rope trouble when your rope is lubricated regularly with Texaco CRATER.

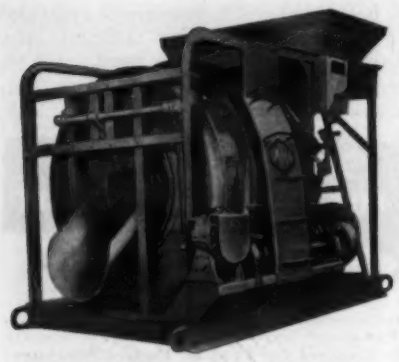
Crater coats each individual wire with a tough, viscous film that is weather-proof, rust-proof, water-proof. Lasts several times longer . . . makes your wire ropes last longer, too. Ordinary wire rope lubricants are costly to use because they throw off when run over small sheaves at high speed. Crater costs less to use because it *clings*.

FOR GEAR TEETH. Crater quiets gears immediately. Stops excessive noise. Reduces *wear*. A Texaco representative will gladly provide practical engineering service to prove the economies of Texaco Products.

THE TEXAS COMPANY, 135 E. 42nd St., N. Y. C.
Nation-wide distribution facilities assure prompt delivery

FREE TO ALL. 32-page booklet. Where to use Crater and how to apply it to wire rope and gears. Dozens of ideas for the practical man.

TEXACO *Industrial Lubricants*



The New Smith 28-S Non-Tilt Mixer

New 28-S Non-Tilt Mixer

The T. L. Smith Co., 2857 N. 32nd St., Milwaukee, Wis., mixer manufacturer for 37 years, has announced a new 28-S non-tilt mixer built to give greater speed and higher efficiency. A new variable speed drive makes the machine equally efficient with either dry or wet batches. The drum is larger in diameter and narrow, permitting faster charging and discharging. It is equipped with renewable full-width liners and full-width converging buckets. The wearing edges of the buckets are coated with an unusually hard alloy metal developed by engineers of the Smith Co. to increase the life of the buckets.

Other features of the new 28-S include the heavily reinforced streamline frame, end-to-center mixing action, an enclosed gear reduction unit, a power discharge direct-connected to the countershaft with a worm and gear running in oil, multiple V-belt drive, a new self-contained vertical syphon-type water tank, a three-way balanced piston-type valve, and oversize anti-friction bearings.

New Steels and Alloys In Hanson Excavators

Through the liberal use of newer, tougher steels, such as nickel, chrome, molybdenum and the numerous grades of high carbon steels and various heat treatments which give increased strength and longer life, smaller lighter-weight machines with greater strength are capable of handling the same capacities as machines formerly 4 to 6 tons heavier. This is a feature of the Hanson excavator made by the Hanson Excavator Works, Tiffin, Ohio. These excavators, in several sizes from the Model 66, a ¾-yard shovel convertible to an 8½-ton crane with gasoline or diesel power down to the Model 33, a ⅜-yard shovel convertible to a 4½-ton crane, have taken advantage of the greater strength and lighter weight of the newer steel and alloys.

Line drive and independent control reduce friction and increase production. The crawler shoes are of high-carbon cast electric steel, heat treated, having a smooth roller path for the accommodation of the round-faced guide rollers. The shoes are of the side lug driving type designed to be self cleaning. Steering through the crawlers is controlled completely from the operator's seat within the cab. The weight of the Hanson is evenly distributed on the twelve crawler rollers with no weight carried on the driver or idler sprockets.

Chain crowd is another Hanson feature designed to add stability to the boom and dipper stick and permitting vigorous shaking of the bucket while working in sticky material. The clutches have large friction areas, eliminating heating, and are power controlled in either direction.

Complete information on any one of the Hanson excavators will be found in the series of bulletins which contain complete dimensions and working ranges.

BARGAINS in Construction Equipment

The directors of the Middle Rio Grande Conservancy District have authorized us to offer the last of their construction equipment, made available by completion of the construction work, at bargain prices. This equipment is all in good condition and includes

50B Bucyrus-Erie Diesel Draglines
775 P & H Diesel Draglines

pumps, compressors, lighting plants, tractors, shovels, pile driving outfits, concrete mixers, scales, Insley concrete placing outfit, concrete heaters and vibrators, gravel screening plants, compressed air drill sharpeners, shop equipment, gasoline powered hoists with and without skips, bar benders and cutters, carbic floodlights and other items at bargain prices. Wire or write for complete list and prices

R. L. Harrison Co. Inc.
Albuquerque New Mexico

NEW! DAVENPORT PAVER'S SANDAL LEAVES NO FOOTPRINTS.....

THIS new Davenport Wood Sole Shoe is ideal for asphalt workers. No shoe impression is left in the asphalt because the 3-inch spikes contact the concrete road base. The spiked prongs are securely fastened to flat-cut soles with two counter sunk bolts and lock washers. Recessed heels and curved soles give comfortable fit over regular shoes. Regular Paver's Sandals without spikes also available with curved sole, galvanized iron counter and adjustable instep strap. Orders filled same day received. Low quantity prices!

FREE GUIDE *Write today for Davenport Wood Sole Shoe Manual—your guide to economical foot protection for employees.*

F. J. STAHMER SHOE COMPANY, Davenport, Iowa

World's Largest Exclusive Manufacturers of Wood Sole Footwear

"If preformed wire rope lends itself best to your operations:—"

Form-Set

WILLIAMSPORT'S METHOD OF PREFORMING

will serve you with greater economy.

PURPLE STRAND

Where your work calls for the utmost quality in rope—solid strength and easy handling—it calls for Purple Strand "Form-Set." This top-notch rope is preformed by our own method, to handle your hardest work and give uniform longer service . . . to save you money!

WILLIAMSPORT WIRE ROPE CO.

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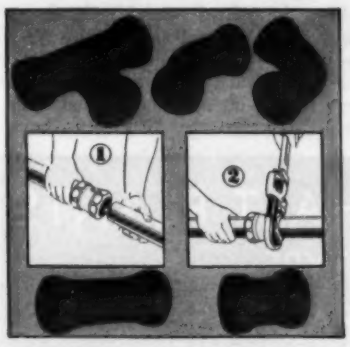


Dresser Style 65 Fittings and (Center) the Simplicity of Installation

Savings in Pipe Work, No Cutting, No Threads

The time lost in cutting pipes to exact lengths, threading, grooving, flaring, or screwing up joints in cramped quarters, is no longer necessary, according to an announcement from the S. R. Dresser Mfg. Co., 391 Fisher Ave., Bradford, Pa. The new line of Dresser Style 65 fittings require nothing but an ordinary wrench to complete a joint in a few moments.

After inserting the plain-end pipe into the fitting, which comes completely assembled, it is necessary to tighten only two threaded octagonal follower nuts with a few quick turns of a wrench. As this is done, resilient armored gaskets at each end of the fitting are compressed tightly around the pipe, forming a positive seal. This results in a permanently tight joint which absorbs normal vibration, expansion and contraction movement, and permits deflections of the pipe in the joint. If the pipe is already threaded, it can also be joined in the same way.

The complete line of Style 65 fittings includes: standard and extra-long couplings, ells (both 45-degree and 90-degree), and tees, all supplied in standard steel pipe sizes from ½- to 2-inch inside diameter, inclusive, black or galvanized. These fittings are recommended by the manufacturer for simplifying joint-making and repair work on both inside and outside piping, for oil, gas, water, air, or other industrial lines. The basic principle is essentially the same as that used in other styles of Dresser couplings. Further details and prices may be secured by writing direct to the manufacturer and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Latest Industrial Models of Continental Motors

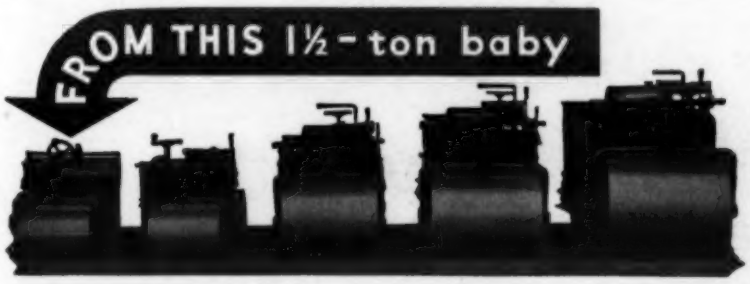
The Continental Motors Corp., of Muskegon, Mich., has announced two new 4-cylinder Industrial Red Seal engines. These are Model Y69, a 2¼ x 3½ 4-cylinder engine with 69-cubic inch displacement, and Model Y91, a 2⅞ x 3½ 4-cylinder unit with 91-cubic inch displacement.

Designed strictly for heavy-duty industrial service, these units incorporate many exclusive Continental features, such as the fuel induction system which includes individual porting. General specifications cover all industrial requirements, such as gear front end, mechanical governor, full-pressure lubrication, and crank and connecting rod bearings of the interchangeable type of thin-shell, steel-backed babbitt. The crankshafts are forged of high-carbon steel and are carried on three large main bearings. The circulation of water in the cooling system is controlled and directed by the internal construction of the cylinder block. Large water jackets surround cylinders and valves in accordance with Continental practice.

These units are furnished as open-type power units, including radiator and gas tank, or as complete power units including sheet metal housing and muffler. They are also available with a heavy-duty industrial type power take-off, furnished with or without clutch. Reduction gears are also available and can be supplied with or without clutch.

A vertical-type carburetor, 15-inch fan driven by a V-belt, a 5¼-gallon gasoline tank from which the fuel is taken by a lever-type fuel pump, and a fixed spark type magneto with gear-driven impulse coupling are standard equipment.

Senor Cortez Herrera, Sub-Secretary of Communications and Public Works of Mexico announced recently that that country will spend approximately 21,000,000 pesos on highway construction during 1937, one-half of which will be contributed by State Governments. He also stated, according to a report from the U. S. Bureau of Foreign & Domestic Commerce, that by July 1, 1937, the Laredo-Mexico City section of the Inter-American Highway will be entirely completed and with highway guards in the mountain regions.



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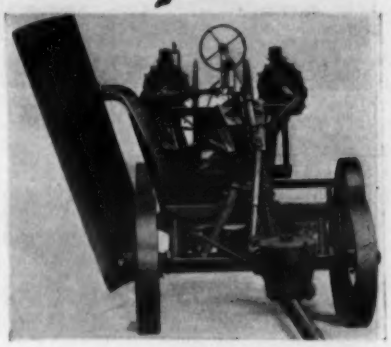
BUFFALO SPRINGFIELD ROLLER CO. SPRINGFIELD, OHIO

New Galion No. 108 Grader Has . .

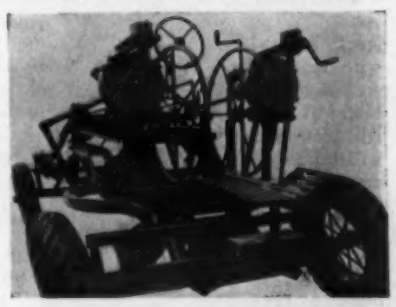


Completely Adjustable Blade

provides a wide range of adjustments and can be swung outside of frame for bank-cutting . . or extended far out of line of rear wheel for shoulder work. Draw bar and circle assembly of rugged construction.

Full Flexibility

is assured by the ball and socket frame king bolt connection. Strong sturdy construction to withstand any stress or strain encountered under the most severe conditions. High pressure lubrication throughout.



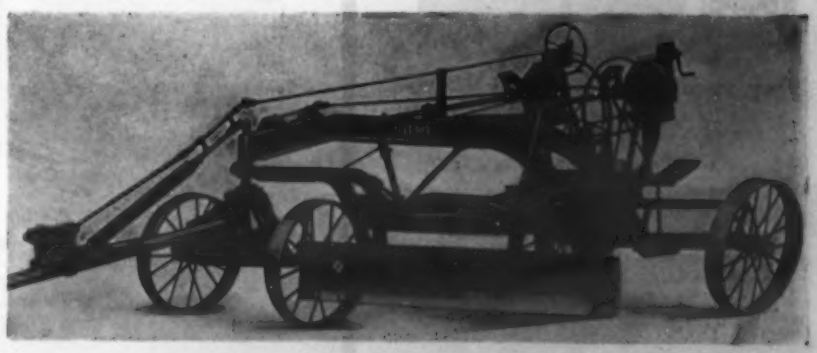
Better Visibility

Being of the "V" type, the frame is narrow at the front and wide at the rear for better balance and stability. Platform is so arranged as to provide full visibility of work . . all controls are closely grouped for convenience.

Strong, Sturdy 11-Tooth Scarifier

operated by Acme thread screw lift with counter balance springs. Teeth are adjustable and key locked. This attachment is an extra. Can also be equipped with bank sloper with flat or V bottom.

This New Galion No. 108 leaning wheel grader is fully capable of meeting all requirements of moderate grading and ditching work. Further details sent on request. Send for Bulletin No. 211.



THE GALION IRON WORKS & MFG. CO.

GALION, OHIO

Above, a Giant Crane Handling a 100-Foot Smoke Stack. Below, a Close-Up of the Base of the Crane

New Giant Mobile Crane Tackles 100-Foot Stack

A huge new crane designed by R. G. LeTourneau, Inc., Peoria, Ill., was recently used for lifting an all-welded steel smoke stack and putting it into place. The smoke stack is 100 feet long, weighs 10 tons, is 57 inches in diameter and is made of ¼-inch steel pipe.

The crane is an all-welded steel job with an 80-foot boom. It is mounted on six 18 x 24.00 tires and is powered by a Caterpillar RD8 tractor. The entire job of lifting and putting this smoke stack into place took just 30 minutes with this crane. The crane is so designed as to be reversible, that is, the boom that is shown in the air in the illustration can be made the tongue, in which case the present tongue would become the boom. In the reversed position it has a lifting capacity of 40 tons and it is planned to use it in this way later for moving an all-steel house that is now being fabricated in the LeTourneau factory.

New Association Bulletin Summarizes Stabilization

Practical and serviceable information for the engineer and contractor engaged in the design, construction and maintenance of roads stabilized with calcium chloride has been brought together in compact form in Bulletin No. 25 of the Calcium Chloride Association, Penobscot Bldg., Detroit, Mich.

The opening chapters discuss the principles of stabilization and give practical specifications for binder-soil and fine and coarse aggregate mixtures. The important calculation necessary for the design of a stabilized base or surface course is the subject of one entire chapter. The best methods of sub-drainage and surface drainage comprises another chapter. No highway is complete when construction ends, for maintenance is the means of continuing its service. This subject is given adequate treatment through discussions of blading, the addition of calcium chloride where necessary, patching and shoulder maintenance. Roads stabilized by calcium chloride as one step in stage construction is discussed in some detail. The remaining chapters consider the essential properties of calcium chloride and the use of these properties in road stabilization, standard specifications for determining various properties of soils and calcium chloride and a glossary of soil stabilization terms.

"Nuts" and Trees

At the Highway Research Board meeting last November this very apt quotation was used as a warning against taking the job of roadside development away from trained state highway engineers and landscape architects: "There are more nuts bearing trees to plant than trees bearing nuts planted."

PORTABLE ASPHALT PLANTS
TOWER TYPE
LARGE CAPACITIES
HOT OR COLD MIX
Accurate control of materials to comply with any standard specifications for bituminous mixtures.
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HETHERINGTON AND BERNER INC
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METAL ACCESSORIES FOR HIGHWAY CONSTRUCTION

METAL housings—escape containers—and housing seals for expansion joints are now being widely recommended by engineers for State—Municipal—Railroad and Civil work.

• SERVICISED metal accessories have been carefully designed and engineered—therefore you may be sure that the performance is right—the quality is right and the price is consistent with SERVICISED QUALITY.

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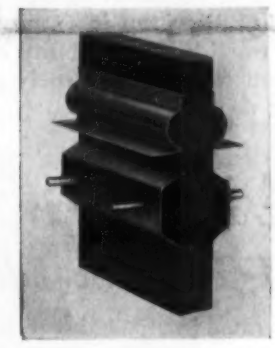

An extruded fibre mastic product provided with grooves for the metal accessories used in connection with flow control. Escape dowel locks and supports plus upper escape and seal combination control the oozing tendencies in this joint. The metal forms contribute to the rigidity of the joint and afford a simple economical means toward a positive seal. The means of properly housing the dowel bars so as to hold them in rigid position while the concrete is being poured is effective and certain.

ARM DOWEL SUPPORT can be used in connection with any type of preformed expansion joint material. Provides a rigid support for the dowel bars and keeps them in perfect alignment. Dark openings shown in end section are air cells which give maximum collapsible volume and control extrusion.

WIRE DOWEL SUPPORT is another method of rigid support for dowel bars. Note the top and bottom caps to which the wire supports are fastened. These caps provide a water seal for both the top and bottom of the concrete slab.

METAL SIDE EXTRUSION SHIELDS for premoulded asphalt expansion joint. These rigid side plates are designed to take up extrusion of the expansion joint material, eliminating any possible oozing over the top of the concrete pavement slab. Also provides a rigid support during installation.

THIS METAL HOUSING is for the fibrated asphaltic joint and controls oozing of upper structure. The base is prepared from a non-oozing material.

SERVICISED PRODUCTS CORP., 6043 W. 65th St., Chicago, Ill.

Good Organization Results in Good Roads

(Continued from page 9)

roads in Dona Ana County. The climate is very dry, the only rain coming during July and August, making the problem of maintenance difficult. The aim of the county road department is to blade out all the corrugations on the road, which requires cutting and pushing all loose gravel clear across the road. Then sometimes the equipment is turned and the loose gravel spread back across the road. In dry weather it is necessary to move the gravel to one side of the road until it rains or else take a sprinkler out and wet down the road and then spread the gravel evenly over the surface to keep the dust down.

It is well known that no two roads work exactly alike. The operator on each section must be educated by the Road Superintendent so that he will know just what needs to be done to the road and whether to push the gravel across the road and spread it back, push the gravel across and leave it, or push it to the center, cutting out the corrugations on either side as the work progresses. It is also necessary to watch the work closely or an operator is likely to "wake up suddenly" and find that he has cut all the gravel off the road.

In Dona Ana County a mixture has been found that has proved very successful as a binder, producing a very hard surface which holds up well. This consists of a mixture of about 60 per cent caliche and 40 per cent gravel. The New Mexico A. & M. College did the experimental work on this binder and developed the proper proportions.

There are also about 250 miles of dirt roads in the county, maintenance of which is simple, as new dirt can be secured anytime it is needed by shouldering up the road. In working the road the earth is pushed to the center and then spread. Every mile of the 650 miles of roads in the county is covered by a maintenance crew every ten days.

Accounting

A careful system of accounting makes possible a complete knowledge of the cost of all operations on the roads and bridges. Each dump truck used in repairing the road or on new construction is charged out to the road on which it is working and the amount of labor, as well as gas and oil, recorded. This gives the office every day a complete record of the work being done and whether the proper amount of work is being accomplished in each 8-hour day. Each road and each bridge has its account number.

Bridges

There are 561 bridges more than 20 feet long in the county, five of which are from 150 to 200 feet long. A single bridge truck with a foreman and two helpers handles bridge maintenance except in unusual cases when additional labor is required. Everything that is bought is charged to the particular bridge on which it is used.

The Provincial Highways Bureau of Chekiang, China, has its own motor repair shop capable of making motor parts and bodies. It also runs 28 smaller shops able to build charcoal tanks. Of the 1,700 "non-privately-owned" cars and trucks in Chekiang province, 87 are remodelled from gasoline to charcoal burners, and 22 are diesel motor parts.

—China Economic Journal

Road Work in Ecuador

The Government of Ecuador is reported to be planning the construction of 745 miles during 1937, and in addition is planning a 9-year program of public works on the basis of an annual budgetary allotment of $2,000,000, making a total of $18,000,000 for the 9-year period, according to a report from the U. S. Bureau of Foreign and Domestic Commerce. The amount earmarked for highways is $6,284,000. During the same period there will be an allotment of $1,584,000 of which $304,000 will be for roads in the Oriental Region and $1,280,000 for maintenance.

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YES sir — there IS a decided difference in Heil Quality construction methods as compared to ordinary methods — Even casual examination will convince the skeptic that Heil actually does put more of what it takes into every Heil Quality-Built product which explains why Heil dump units stand up under the terrific strain of continuous dumping service — The rugged simplicity of Heil design insures long life and satisfactory operation — For your own protection — SPECIFY AND INSIST ON HEIL DUMP UNITS — New, 1937 literature is ready — send for your free copy of Heil Bulletin No. SL-237. Address:

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Also DeLuxe Auto-type Streamline Cab (as shown in upper illustration) or Standard Side Entrance Military-type Cab; Spring Stabilized Front End or Standard Oscillating Front Axle; Large Diameter Circle, extra-long Blade Base, and powerful Screw Lift Blade Lifting Mechanism, insure your getting a Modern Machine that will deliver the utmost in Service and Satisfaction.

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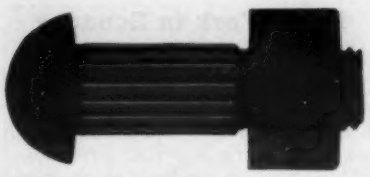

The Structural Rib Bolt Used With Anco Nuts

New Lock Nut and Bolt Aid in Steel Erection

A special bolt with structural ribs and a nut that locks have been developed by the Automatic Nut Co., Inc., Lebanon, Pa., for use in the erection of buildings, bridges, tanks and towers. It is claimed that the use of structural rib bolts and Anco nuts results in a saving in the cost of material as compared to rivets as well as in labor and the additional equipment required when rivets are used. The high cost of dismantling is eliminated as the Anco nut locks and unlocks with the use of an ordinary wrench.

The nut stays locked because the end of the locking pin travels between the threads of the bolts. In doing this the pin assumes automatically a fixed angle and establishes a point of impingement against the bolt, the pin biting into the body of the bolt and thus maintaining an anchorage against vibration and shock. This really acts as a ratchet, moving up and taking a new bite as the nut is drawn tighter, preventing the nut becoming loose. These nuts can be removed with an ordinary wrench as easily as an ordinary nut merely by exerting sufficient pressure with the wrench which moves the pin automatically to a slightly different angle, releases the ratchet action of the pin and permits the nut to be loosened and removed.

The structural rib bolt has a standard button head and the ribs are triangular shaped which embed themselves in the wall of the hole in the work. The bolt is made of carbon manganese steel with a minimum tensile strength of 70,000 pounds per square inch. U. S. Standard No. 2 threads are used and the automatic nuts are U. S. Standard which will fit any bolt and lock and unlock with an ordinary wrench. The ribs do not project beyond the thickness of the plates if proper specifications are given when ordering them. The spacing of these bolts is the same as for rivets. The rib bolt is driven through the hole with a hand hammer or sledge and the nut drawn tight with a structural wrench.

Literature describing this new structural rib bolt with Anco nuts as a substitute for riveting may be secured direct from the manufacturer by mentioning this magazine.

New Steel Bridge At Vancouver, B.C.

The Dominion Bridge Co. and the Hamilton Bridge Co. have been awarded the contract to construct the steel superstructure of the $6,000,000 Lions' Gate Bridge over the entrance to the harbor of Vancouver, British Columbia, according to an announcement by A. J. T. Taylor, President of the First Narrows Bridge Co., Ltd., of Vancouver. This company was formed by British interests who have financed the erection of the span which will link Vancouver with a newly developed residential area on the north shore of Burrard Inlet.

The superstructure of the span, which will require 10,000 tons of steel, will cost approximately $2,400,000, labor included. Work on the substructure and road work have already been started by the contracting firms, Stuart Cameron & Co., Ltd., of Vancouver and the Atlas Construction Co. The Lions' Gate Bridge is being built under a 50-year franchise as a private toll undertaking. It will be ready for traffic by September, 1938.

The bridge is to be 209 feet above high water, the third highest in the world. It will also be the largest suspension bridge in the British Empire and will have a capacity of 3,000 automobiles an hour. The bridge will cross the First Narrows from Prospect Point in the famous Stanley Park to the Capilano River on the north side. The structure, including the approaches, will be more than 1 mile long and the central span will be 1,500 feet clear.

IRONER ROLL • SCARIFIER • and GRADER BLADE • *In One*

A complete maintenance unit for highway contractors and state, county and town engineers.

Ironer roll and *scarifier* are interchangeable. *Grader blade*, quickly attached, greatly increases the usefulness of this ROLLER

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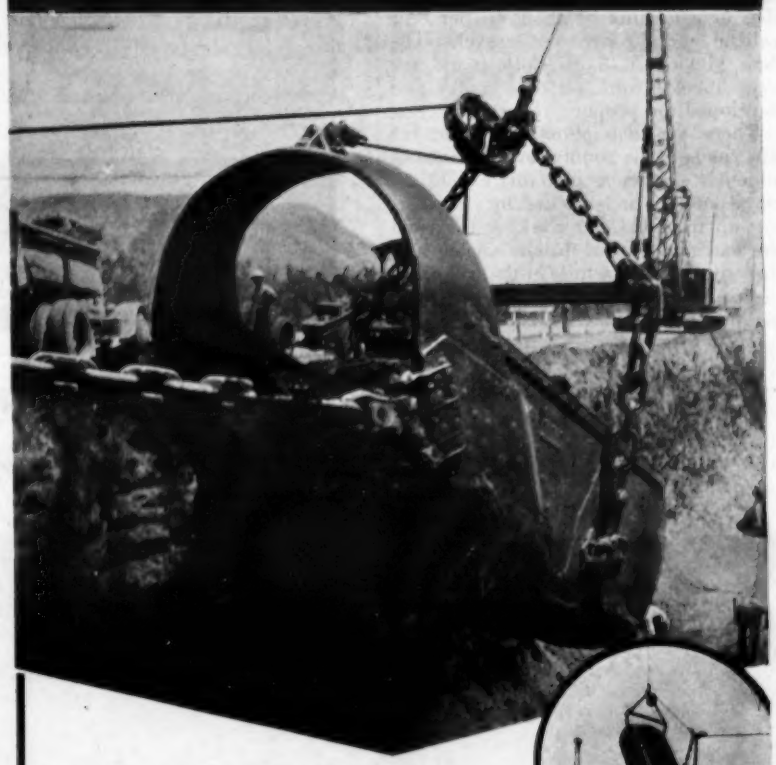

Users Report On Yardage Increases Read Their Results:

One Contractor writes:
"Excavation was around walls and involved the digging of hard clay to a depth of 28 feet. This work was completed in three months—one-half the time we figured necessary."

Another AUTOMATIC owner reports:
"We are stripping 25' overburden, some of which is hard pan and rock. Since putting on the AUTOMATIC we are stripping at least 50% more material."
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Ask any AUTOMATIC owner or operator about his yardage records with the patented rounded front AUTOMATIC bucket! Then see your equipment dealer or write us direct for information on a size and weight bucket best suited to your machine and job. Bulletin "THE AUTOMATIC" gladly sent on request.

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CMC 4-Wheel End Discharge Mixers—portability with stability—7s 10s 14s.

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The most talked of book in the industry—crammed with pictures and information on the new CMC Line of Mixers, "Dumpover Pneumatic Tired Concrete Carts, Hoists, Pumps, Saw Rigs—Wheelbarrows. Write for your copy.

CONSTRUCTION MACHINERY COMPANY
WATERLOO, IOWA

C. & E. M. Photo

The Sump and Pump House, Showing the Drain for Surface Water

Permanent Drains On Underpass Job

(Continued from page 2)

the entire length of the depressed section of the profile extended to a point 3 feet below the finished roadway surface.

The contractor was therefore required to construct the drain as his first operation, so that the drain would dry out the material remaining in the area bounded by it. As construction progressed, this is exactly what happened, and what normally would have been an extremely wet condition resulted in a dry excavation job for the underpass cut.

Construction for Drains

Trenches for the 18-inch perforated corrugated metal pipe were excavated by dragline and by hand with sheeting below water level which was close to the surface. Water from the far side was pumped across the railroad and the entire section drained to the concrete pump house that now houses the two 4-inch drainage pumps. A Jaeger 2-inch gasoline-driven pump was installed in the bottom of the 6 x 8-foot sump 20 feet below ground level with the exhaust carried to the surface through a 1-inch galvanized pipe and the water delivered to a 36-inch corrugated metal pipe draining to the river. The fire hose attached to the pump was carried out a vent in the back of the pump house and to an opening cut in the 36-inch pipe.

With the drainage trenches 3 feet below the finished grade, the perforated pipe was able to take the water out of the entire prism of roadway excavation and the self-priming pump in the bottom of the pump house was able to remove all water that entered through the lowering of the water table.

The pump house is an attractive structure of concrete with metal louvred windows for ventilation and a metal door and frame. It has some architectural treatment to harmonize with similar treatment of a structure across the road and to relieve the usual "pill box" appearance of the engineering concrete structure placed in a neighborhood for utilitarian purposes.

The permanent drains enter the sump 5 feet above the bottom of the pump house well and thus add their volume to the storage capacity of the system when heavy rains occur. The bottom of the sump is 20 feet 8½ inches below the bottom of the floor of the motors at ground level. Further, to add to the storage capacity and to aid in maintaining the drainage of the surrounding area the drainage pipes are bedded in ¼ to 2-inch gravel for 1 foot below the pipe, around the pipe and to the top of the trench. There are two inlets to the drains from the roadway one half way down the approach roadway slope and another pair at the bottom of the underpass. The drainage is pumped by a pair of 4-inch centrifugal pumps to pipes leading to the Jordan River about a mile away.

After shoo-flying the railroad tracks carrying a heavy freight traffic to a classification yard about a mile away, the roadway excavation was started with a ¾-yard Osgood steam shovel loading to a fleet of five Mack trucks. A tractor with bulldozer was used to maintain the roadway in good condition for the hauling fleet and to push loose dirt into the path of the shovel. At the same time, the drainage pipe was jacked through the railroad embankment.

Highway traffic was detoured to a new road built 1,200 feet south of the project, connecting with a new crossing over the tracks. This detour was oil matted and will be used in local development when it ceases to be used as a detour.

Turkish Road Building Plan

An elaborate road-building program which it is hoped can be put into effect during the coming fiscal year is being planned by the Turkish Ministry of Public Works, according to a report from the U. S. Bureau of Foreign and Domestic Commerce. Among the new roads planned are the completion of the Istanbul-Edirne highway; a direct highway between Istanbul and Ankara; and a series of roads and highways along the Black Sea littoral from the Russian frontier to Trebizond.

The construction of a considerable number of highways extending from the various railway lines to nearby towns and villages to serve as feeder roads to the railways is also contemplated.

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The New Littleford Model "C" Pressure Distributor has all the advantages —can do everything—for which you ordinarily pay extra. Yet you pay no more for it than for what is usually known as a standard outfit. In addition, you get several extra advantages with your Model "C" that NO other machine on the market includes.

It has the fastest heating system of any distributor. It will thaw out pump, valve and lines in 3 minutes from a cold start without the need of auxiliary burners. Yet it is absolutely safe—no "hot spots" or burnt out flues. It will heat and apply the heaviest bitumen quickly and accurately. The spray bars cut off instantly without dribbling. And it's the simplest distributor made—the easiest to operate.

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Better Equipment For Greater Profits

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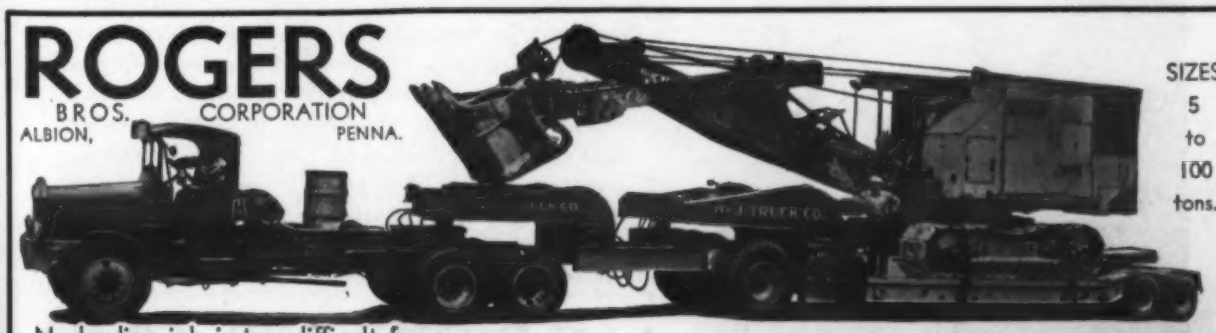

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Tax Records

(Continued from page 33)

formation kept on the general payroll record from the payroll to separate employee records for each individual employee.

Records of Working Time

The Division of Unemployment Insurance of the State of New York has laid down rules as to records of working time of employees, which are of particular interest. An employer of traveling salesmen or home workers remunerated on commission or piece work basis, the employer having no control over the working time of the employee, should maintain the same records as for other employees. Under item "days worked" and "hours worked," the note "home work" or "traveling salesman," or some other descriptive term should be entered.

Clerical workers who work in excess of the normal hours previously agreed upon, but who do not receive pay for such overtime, do not require special entries of such overtime. Employees on the fixed stipend basis should be recorded as full time employees, and no record need be kept currently of the number of hours worked nor the number of days worked when paid at least the full amount of the weekly wage. A record must be kept of hours and days worked if less than the normal week is worked and deduction is made for such short time.

If all employees within a group are paid on a weekly or semi-monthly basis, irrespective of the hours and days actually worked during such period, no detailed record need be kept of actual days and hours worked.

Combination Records

Employers who are subject to the provisions of Title IX of the Federal Social Security Act or to the state payroll tax laws, who have been compelled to set up records as a basis for these exactions have, without a doubt, given consideration to the necessity of providing proper records under Title VIII of the Federal Social Security Act. Employers who have not come within the provisions of Title IX of the Federal Act or the state unemployment insurance laws, may have given no consideration to such employment records until required to do so by the necessity for making reports under Title VIII for the month of January, 1937.

Doubtless employers of the first type have realized the advantage of providing forms which would take care of all Federal and state social security taxes. Thus, the forms designed for covering 1936 records may probably include sections covering the old age benefit exactions. In fact, many of the standardized forms offered by loose-leaf records and systems organizations embrace information for each type of tax.

Although many of these standard forms have been carefully prepared and would adequately comply with the provisions of the Act and regulations, they are not always entirely satisfactory. Frequently they do not take into consideration established payroll procedures appropriate to the particular circumstances of the taxpayer. Consequently, duplication of routine and clerical work is required which might be eliminated if specially designed forms to suit the case are used. In reviewing the accounting system and setting up forms to take care of the Federal and state social security taxes, the qualified expert will give consideration to all elements of the business and have constantly in mind the necessity of reflecting in the accounts the proper records of transactions to effect the minimum tax obligations.

Moving Dirt at the New Airport for the City of Portland, Ore.

Airport Construction With Husky Dirt Movers

The new airport for Portland, Ore., is being speeded to completion by a fleet of tractors, scrapers and bulldozers. The new airport borders the Columbia River and is 7½ miles from the center of the City of Portland. It will have adequate facilities both for sea and land planes. Work began on the project on April 1, 1936, and it is scheduled for completion on July 1, 1937. The field is to be 1 mile square and have 6,000-foot runways. Pavement for these runways will be the equivalent of 55 miles of standard 20-foot roadway pavement.

Some 4,600,000 yards of material will be dredged fill and an additional 2,000,000 yards is being moved by tractors in the various grading operations. The cost of the project will be around $3,000,000. Two International TD-40 diesel TracTracTors pulling Isaacson Skraper-Karriers and four International TA-40 TracTracTors equipped with Isaacson Trac-Dozers were used for leveling the material.

Rubber Paving Blocks Bounce Up Again

According to a report received by the Bureau of Foreign and Domestic Commerce from Stockholm, a Swedish manufacturer has started manufacturing rubber paving blocks to be used as a street surface. This material is now being tested on a bridge in Stockholm and if the blocks prove satisfactory it is believed that the Stockholm Street Administration will use rubber blocks for surfacing a number of streets and bridges where other surfaces have failed.

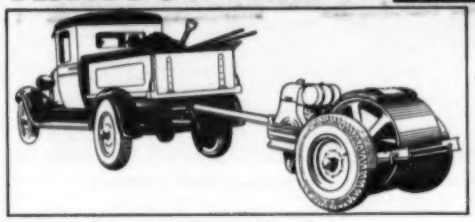
The bridge where the tests are being made has formerly had a wood surface which has not been satisfactory, especially in winter. Tests have also been made with asphalt surfaces, but neither the wood nor asphalt has lasted more than 2 years on the bridge. It is expected that the rubber paving blocks will last about 5 years. For protection against slipping or skidding the blocks are grooved at a 45-degree angle to the direction of traffic.

THE PARSONS TURBO RETREAD

The only machine which mixes, windrows, spreads and edges Road Mix Materials. Used by leading road builders for every kind of binders, road oils, cutback asphalts, emulsions, calcium and cement stabilization.

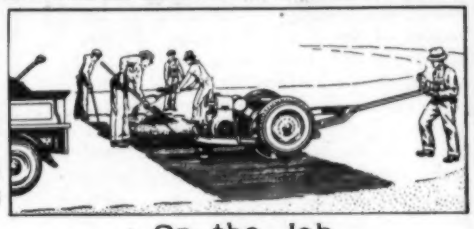
THE PARSONS COMPANY
NEWTON, IOWA.
Please mention Contractors and Engineers Monthly

ANNOUNCING A MOTORIZED WHEELED ROLLER



To and from the Job a High-speed Trailer

MODEL 135
COMPRESSION 135 LBS. PER INCH OF CONTACT
The most economical and efficient Roller for all types of patch work and miscellaneous small jobs.
Write for DETAILS!



On the Job a Self Propelled Roller.

The WHEELED ROLLER Corp. ★ SAN ANTONIO, TEXAS

WHY I BOUGHT AN "ETNYRE"
***After Investigating All* BITUMINOUS DISTRIBUTORS**

NEW CATALOG tells all about the new Etnyre "FC and FX" Distributors. Ask for No. 506.

"I have compared and tested all Bituminous Distributors. . . . I am convinced that no other equals the "Etnyre" for *accuracy* of distribution, *simplicity and economy* of operation and dependable, *long-life service.* I find there are more Etnyres in use than any other type of distributor . . . and for good reasons. The Etnyre "Instantaneous Shut-Off Spray-Bar" which eliminates "dripping and slobbering" is the greatest improvement ever made in distributors. Etnyre 'Full-width-distribution' spraying up to 24 ft. road-width in *one* trip prevents over-laps . . . cuts operating time in half . . . and handles asphalt, tar, road oil or emulsion, either light or heavy applications for every type of bituminous road requirement. The Etnyre more than meets all Highway Dept. specifications. I am convinced the Etnyre will prove one of the soundest investments I have ever made."

E. D. ETNYRE & CO.
OREGON ILLINOIS

Ingenuity Saves Money At Grand Coulee

(Continued from page 36)

in diameter by 1 inch by 1 inch.

Saw Operated by Compressed Air

The world's largest timber crib has been mentioned before in these columns. They were still building on it last September, getting ready for diversion of the river through the west cofferdam area, which was to come soon. In building such a crib, there are an inconceivable number of timbers to be sawed, a foot or more through. To rush the job along, the contractor had just purchased a new type of chain saw, operated by an Ingersoll-Rand Type A air motor. And how it did zip through those timbers! The motor develops 3 horsepower, said to be more power per pound of weight than in any other type of powered saw. Sometimes a timber has to be sawed under water. The air motor makes no objection to that and operates as well under water as in air.

Driving Drift Bolts

On the big diversion timber crib, and likewise on the cribs that were being built for the wings of the central cofferdam, no man-swung sledges were to be seen driving drift bolts. Here again, compressed air was taking the place of brawn. The holes for the bolts, slightly smaller than the bolts, were first bored with compressed-air-operated wood augers, and then the bolts were driven with Ingersoll-Rand CC 25 drift bolt drivers, operated by two men.

Steel "Tailoring" Department

The statement in regard to the trucks, that the contractor is equipped to build or rebuild almost anything on the job, holds good in many other phases of the work. Much welding fabrication is carried on at all stages. Hoist bases, chutes, hoppers, tanks, truck radiator shells are just a few among the regular things, besides which there are numberless special jobs coming up.

The company does not skimp on cost of any equipment that can show a saving in operation costs. Among the machines on the job is one of the largest types of single torch burners. It is an automatic machine, using a template, and will cut steel from ½-inch up to 6 inches almost as readily as will the cloth cutting machines seen in the shops of clothing manufacturers.

The New Littleford Combined Asphalt Supply Tank and Tool Box

Asphalt Supply Tank And Tool Box Combined

The success of a new supply tank built by Littleford Brothers, 485 E. Pearl St., Cincinnati, Ohio, for the City of Cincinnati for a gang doing sheet asphalt repairing has lead to the addition of this tank to the Littleford line. It will heat 550 gallons of asphalt from a cold start in 90 to 100 minutes and once fully heated, the burner can be turned off and the hot material drawn off all day long without further heating.

The combined tank and tool box holds all the paving tools needed by the gang as well as over 500 gallons of material so that no service truck is required to haul tools and kettle. The unit saves space in congested areas, eliminates several pieces of equipment and, since every part of the unit can be put under lock and key, no night watchman is needed.

The actual capacity of the elliptical tank is 580 gallons. The overall length of the body, exclusive of the pulling bar, is 13 feet 11 inches and the approximate weight when the tank is empty is 6,500 pounds. The heating unit is composed of two No. 5 torch burners, a 20-gallon A.S.M.E. fuel tank and two 6-inch diameter return U-type heat flues. The tank is insulated all over with 1 inch of rock wool. Semi-elliptical springs swing the body on the axles which are carried by wheels with solid rubber tires. Timken-Westinghouse brakes are used on the rear wheels only. The tool box has 72 cubic feet of storage space. The tank has 2½-inch draw-off. A pulling hook for trailers is built into the rear end of the unit.

Have You Seen the . . .

TRU-PLANE MOTOR ROLLER

By HUBER?

The Huber represents the last word in modern Motor Roller construction. All Huber Automotive Type Rollers are available in a complete range of sizes with all the latest attachments and accessories including the Tru-Plane high compression and smoothing roll. Bulletin FREE.

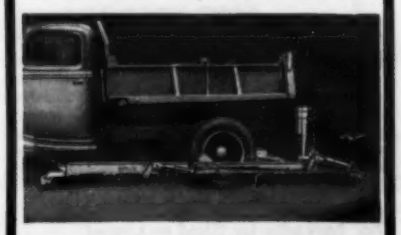
THE HUBER MANUFACTURING CO.
MARION, OHIO

SMOOTH—STRAIGHT SPREAD—ANY DEPTH ALL MATERIALS with BURCH CHIP SPREADER

SAVE time—money—material—in Seal Coating, Re-Surfacing and Sanding Icy Roads and Streets. Width of spread and pounds per square yard controlled by independent motor. Built to take abuse—simple in design—trouble-proof. Use with any size truck having rear dump.

Write for DETAILS and PRICES

BURCH UNDR-TRUK MAINTAINER



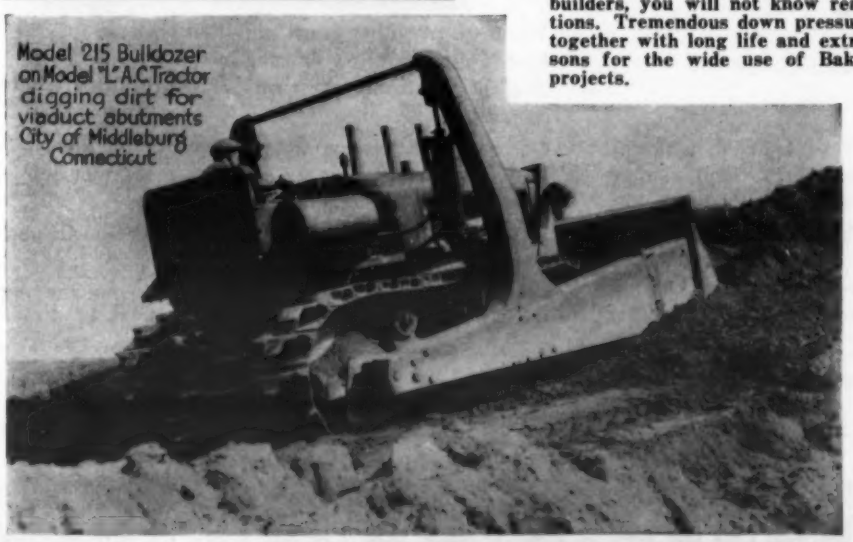
Back truck on—hook up in three minutes. Raise or lower and control blade weight on roads hydraulically. Total length of blades three times that of single blade scraper.

THE BURCH CORPORATION
CRESTLINE, OHIO

BAKER

Better Bulldozer Performance

Until you experience the smooth and accurate performance of the simply-constructed, direct lift Baker Bulldozers and Gradebuilders, you will not know real economy in bulldozing operations. Tremendous down pressure, high lift and great strength, together with long life and extremely low repair costs are reasons for the wide use of Bakers on important construction projects.



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BULLDOZERS
GRADEBUILDERS
ROAD ROOTERS
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Enclosed is my remittance of $1 for the next twelve issues of CONTRACTORS and ENGINEERS MONTHLY.

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N. B. A dollar bill, check or postage stamps will be entirely acceptable.

Bulletins and Pamphlets

For free distribution to contractors, engineers and officials. Write for the catalogs you need.

Pictorial Presentation of Equipment

101 The Koehring Pictorial, a new booklet containing over 100 illustrations showing the complete line of Koehring pavers, mixers, excavators, Dumptors, Mud-Jacks and other construction equipment in action on various types of construction jobs, may be secured by interested contractors and engineers direct from the Koehring Co., 3026 W. Concordia Ave., Milwaukee, Wis.

Roller Bearings for Construction Equipment

102 Complete information on Hyatt anti-friction roller bearings, for which there is a size and type for every application, may be secured by those interested direct from the Hyatt Bearings Division, General Motors Corp., P. O. Box 476, Newark, N.J.

Pile Hammers and Extractors

103 Literature describing McKiernan-Terry pile hammers and extractors, made in a variety of sizes to meet job requirements, may be secured by those interested direct from McKiernan-Terry Corp., 19 Park Row, New York City.

A Black-Top Paver

104 A new catalog describing the features of the Jaeger black-top paver which lays hot or cold bituminous material, stone or macadam up to 1,000 tons a day from 9 to 14 feet in width, may be secured direct from the Jaeger Machine Co., 701 Dublin Ave., Columbus, Ohio.

Controlled-Ignition Tractors

105 Complete information on Allis-Chalmers controlled-ignition oil tractors for all kinds of construction jobs as well as road maintenance work may be secured by interested contractors, state and county highway engineers direct from the Allis-Chalmers Mfg. Co., Tractor Div., Milwaukee, Wis.

Portable Crushing Plants

106 Telsmith portable crushing, screening and loading plants, in a variety of sizes and styles to meet job requirements, are described and illustrated in new literature, Bulletin P-34, which Smith Engineering Works, 4014 N. Holton St., Milwaukee, Wis., will be glad to send free on request.

Buckets Always on the Job

107 The Hayward Co., 32-36 Dey St., New York City, will be glad to send to interested contractors complete information on Hayward buckets which, the manufacturer claims, keeps the job going ahead on schedule because they won't quit or cause time out.

Dump Trucks for Road Builders

108 Complete information on Hug Roadbuilder trucks for road building, excavating, dirt moving and hauling jobs, which are specially designed for the heavy-duty service required on construction jobs, may be secured by interested contractors and engineers direct from the Hug Co., 514 Cypress St., Highland, Ill.

Disc Spreader for Sand or Gravel

109 Kob Mfg. Co., 329 E. Brown St., Milwaukee, Wis., will be glad to send to interested contractors, state and county highway engineers complete information on Kob disc spreaders which fit any dump truck, large or small, and are suitable for spreading sand, gravel, chips, shale, cinders or calcium chloride.

SEND THIS BACK—WE'LL DO THE REST

CONTRACTORS and ENGINEERS MONTHLY
470 FOURTH AVE., NEW YORK

Please send me the following literature, without cost or obligation

(Indicate by numbers)

Name_____

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P.S. Also send me catalogs and prices on_____

Complete Line of Buckets

110 The Owen Bucket Co., 6030 Breakwater Ave., Cleveland, Ohio, will be glad to send to those interested comlete information on its line of Owen buckets for dredging, excavating and rehandling.

Power for Construction Equipment

111 Hercules diesel and gasoline engines, offering a full range of power for heavy-duty construction equipment, are described in literature which the Hercules Motors Corp., Canton, Ohio, will be glad to send on request.

Easy Control for Walking Draglines

112 The short easy-working levers and operating air valves of the Bucyrus-Monighan walking draglines, giving finger-tip control, are designed to decrease operator fatigue and thus increase yardage and profits. Complete information on these walking draglines may be secured direct from the Bucyrus-Erie Co., South Milwaukee, Wis.

How to Make Your Pipe Work Easier

113 S. R. Dresser Mfg. Co., 391 Fisher Ave., Bradford, Pa., will be pleased to send a complete description of the new Dresser Style 65 compression fittings which make it possible to connect any plain end pipe, whether threaded or not, from ½-inch to 2-inch inside diameter, inclusive, with a simple coupling which requires only a single wrench to install.

New Lubricant Catalog

114 The Alemite Division of Stewart-Warner Corp. has just published its new 1937 industrial catalog "Alemite Controlled Lubrication," describing the entire range of Alemite equipment, including hand guns, power-operated units, fittings, hose, etc., as well as showing Alemite equipment in actual use on a variety of jobs. Free copies of this new booklet may be secured direct from Stewart-Warner Corp., Alemite Div., 1850 Diversey Parkway, Chicago, Ill.

New Wagon Drill

115 Complete information on the new Gardner-Denver WDS wagon drill, which is adjustable so that holes may be drilled at any angle from horizontal to vertical and which is designed to meet the widest variety of drilling conditions, may be secured direct from the Gardner-Denver Co., Quincy, Ill.

Hot or Cold-Mix Asphalt Plants

116 Complete information on Cummer asphalt plants for either hot or cold-mix, with 1, 1½ or 2-ton mixers, and electrical or mechanical time lock to meet any state specifications, may be secured direct from the F. D. Cummer & Son Co., 17th and Euclid Ave., Cleveland, Ohio.

An All-Purpose Light-Weight Drill Rig

117 The Worthington Rock Master, a light-weight mobile all-purpose drill for quarries, road work and similar jobs, which is especially adapted for down-hole, hillside, breast-hole, side-hole drilling and snake holing, and which is mounted on pneumatic tires for easy portability, is described in Bulletin W-1200-B8B which the Worthington Pump & Machinery Corp., Harrison, N. J., will be glad to send on request.

Sprayer for Black-Top Work

118 Complete information on the Littleford No. 101 Utility sprayer and its adaptability to all kinds of black-top maintenance work, such as skin and pot hole patching and shoulder dressing, as well as for use in black-top construction, may be secured by contractors, state and county highway engineers direct from Littleford Bros., 485 E. Pearl St., Cincinnati, Ohio.

but that's not all you gain by

CALCIUM CHLORIDE curing of Concrete

THE fact that two pounds of Calcium Chloride with every bag of Standard Portland cement more than doubles one-day strength is now verified by the U. S. Bureau of Standards. You get the increased strength when you need it, for quicker pavement opening, earlier removal of forms (for other jobs), safe, quick handling and shipping of blocks and other products.

In addition to high early strength you get:
Lowered volume changes reduce cracking and crazing.
A more plastic mix which fills forms better.
You get a smoother finish, and do it easier.
Finishing may follow pouring in shorter order.
You can use lower water ratios with resulting greater strength.

On top of all these, you get better concrete always, in all ways, higher ultimate strength, a sounder job all through.

Write any of the firms below for literature on Calcium Chloride in concrete.

CALCIUM CHLORIDE ASSOCIATION

The Dow Chemical Company.....Midland, Michigan
Michigan Alkali Company.....60 E. 42nd St., New York City
Solvay Sales Corporation.....40 Rector Street, New York City
The Columbia Alkali Corporation.....Barberton, Ohio

CALCIUM CHLORIDE
YEAR 'ROUND CONCRETE CONSTRUCTION

Bulletins and Pamphlets

(Continued from preceding page)

Intermediate Types of Asphalt Roads

119 A new 18-page illustrated bulletin has been issued by the Asphalt Sales Dept., The Texas Co., 135 East 42nd St., New York City, presenting clear, brief descriptions of road-mix and plant-mix construction, surface-treatment "blotter-type" surfacing, and dust-laying with Texaco asphalt. A copy is yours for the asking.

Profitable Quarry Work

120 The Austin-Western No. 80 portable crushing and screening plant, which is complete, compact and sturdy, handles rock or gravel, has a rated capacity of 500 yards a day of 1-inch material and which is designed for profitable quarry work, is described and illustrated in a new bulletin which may be secured direct from the Austin-Western Road Machinery Co., Aurora, Ill.

Sheepsfoot Tamping Rollers

121 Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh, Pa., will be glad to send to interested contractors and engineers its Bulletin No. 1550 describing Blaw-Knox (Ateco) sheepsfoot rollers for compacting light and heavy earth fills on highway construction, earth dams, reservoirs, levees and similar jobs.

Tank Car Heaters and Boosters

122 Cleaver tank car heaters for steaming bituminous materials in railroad tank cars as well as for thawing culverts and manholes, cleaning machinery and heating concrete aggregates, and bituminous boosters for pumping and heating bituminous materials are described and illustrated in Bulletin 102-M which the Cleaver Brooks Co., Brumder Bldg., Milwaukee, Wis., will be glad to send on request.

Up-to-Date Equipment and Catalog

123 In keeping with the advances in its line of mixers, saw rigs, hoists, concrete hoppers, concrete buckets and carts, wheelbarrows and salamanders, the Construction Machinery Co., Waterloo, Iowa, has issued a spiral bound 25th Anniversary Catalog that tells the whole story that you want to know about CMC equipment. A copy is yours for the asking.

Wellpoint Systems

124 Literature describing Complete wellpoint systems for drying up the job and making possible faster and more economical excavation may be secured from the Complete Machinery & Equipment Co., Inc., Dept. C, 36-40 11th St., Long Island City, N.Y.

A Tractor Dump Wagon

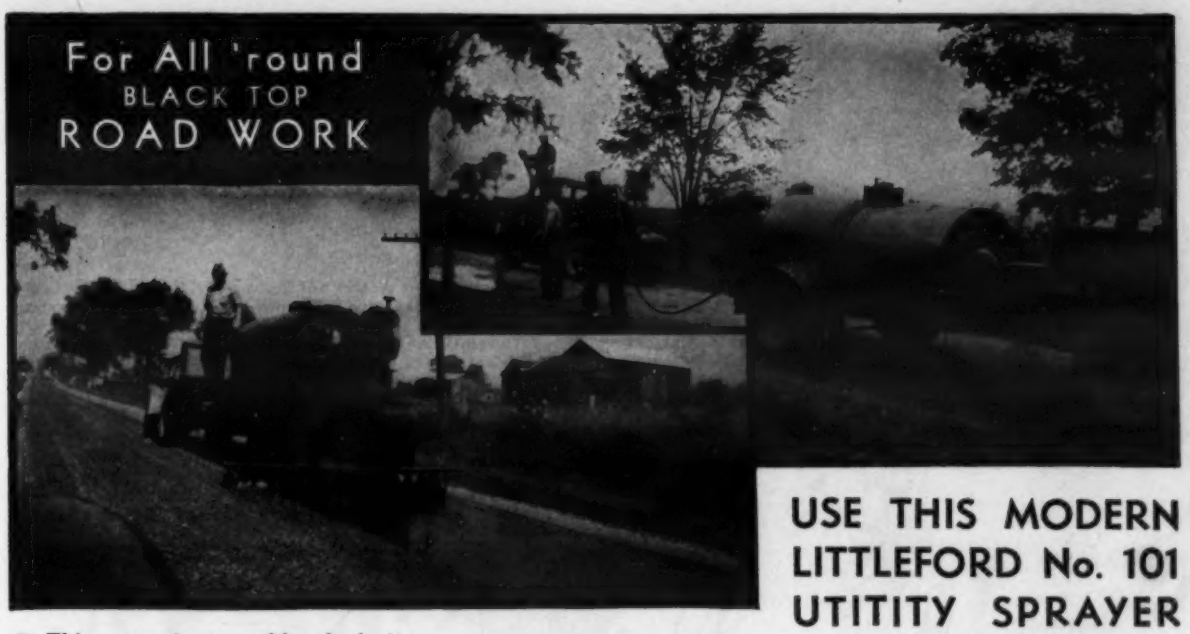
125 The Camel tractor dump wagon which combines in one unit the features of truck, tractor, trailer and bulldozer, with 4 to 5 yards capacity, is described in literature which the Shunk Mfg. Co., Dept. 37, Bucyrus, Ohio, will be glad to send on request.

New Catalog on 3/8-Yard Shovel

126 Catalog 20-A, containing illustrations and complete specifications of the Bay City Model 20 ⅜ or ½-yard full-revolving shovel, dragline and crane, may be secured direct from Bay City Shovels, Inc., Bay City, Mich., by mentioning this magazine.

Highway Products

127 This is the title of a new 24-page catalog, describing and illustrating Truscon steel products for reinforcing and protecting modern concrete highways, including welded steel fabric, expansion joints, contraction plates, guard rail, road forms, and accessories, copies of which may be secured free direct from the Truscon Steel Co., Youngstown, Ohio.



USE THIS MODERN LITTLEFORD No. 101 UTITITY SPRAYER

● This pump type machine is just what you need for skin and pot hole patching, shoulder dressing and tack coating on your construction work. Uses bulk bitumen. Use it for handspray or spray bar work, also for transferring or barrelling material in your yards. Sizes 300 to 1200 gallons. Truck or trailer mounting.

LITTLEFORD
Road Maintenance Equipment
SINCE 1900
LITTLEFORD BROS. 485 E. PEARL ST. CINCINNATI, O.

"WHEN IT COMES TO *BINS* IT'S *HELTZEL* FOR US EVERYTIME"

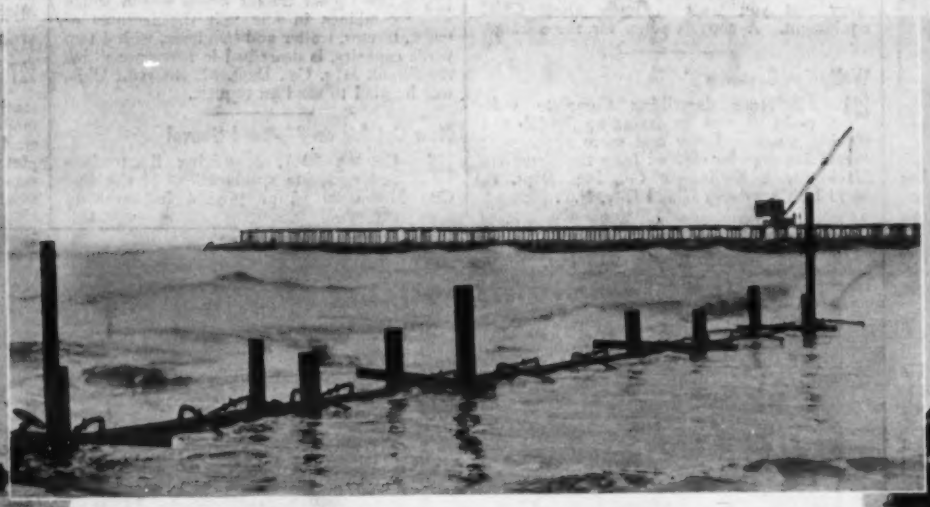
Heltzel Trailer Type Bins for batching one, two or three aggregates and or bulk cement are the strongest portable units built. Every detail of construction is designed for *longest* life at capacity service. The framework of these weighing plants is structural steel—skyscraper built. One-piece jointless legs can never "knee" or spring. Bins are shop machine-riveted.

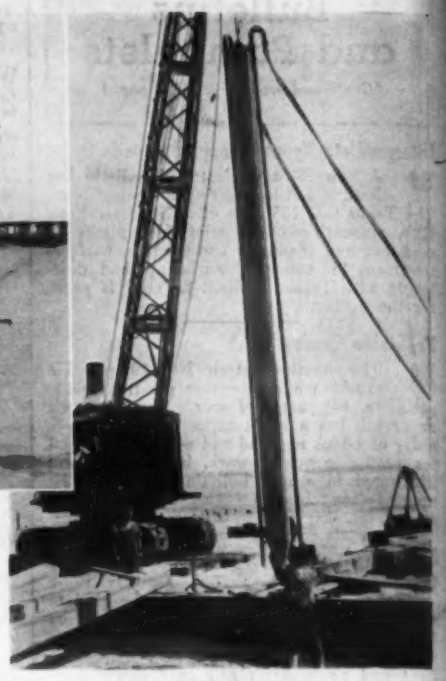
Easily trailed from job to job, these rugged units can be erected and dismantled in a matter of minutes. All materials are weighed by automatic springless dial scale without preliminary adjustments. Scale indicator automatically returns to zero when batch hopper is emptied, providing a check on every batch weighed. This important feature is exclusively Heltzel.

Heltzel Trailer Bins, made in a range of capacities from 17 to 103 cu. yds., have many advantages you can't appreciate unless you have used one. A card or letter will bring full information, promptly!

THE HELTZEL STEEL FORM & IRON CO.
WARREN, OHIO

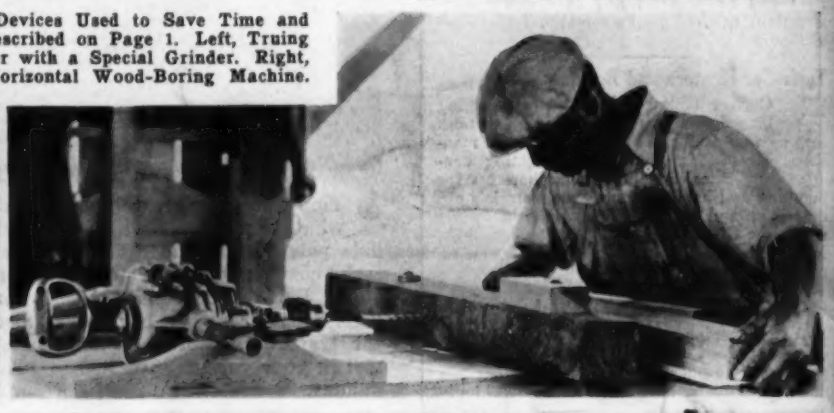
Contractors and Engineers Monthly





To Furnish an Adequate Supply of Sea Water for Jetting the 2,600 Concrete Piles for the New Boardwalk at Long Beach, N.Y., James A. Horton, Subcontractor, Used a Wellpoint System Driven into the Beach to Keep Out the Sand Which Cut the Jetting Pump When Ocean Water Was Used. Left, the Wellpoint System Installed Just Below High Water Mark. Above, the Same Griffin Wellpoint System Relocated at Low Tide Mark. Right, Preparing to Jet One of the 28-Foot Piles. **See Page 14.**

Some of the Many Ingenious Devices Used to Save Time and Money at Grand Coulee Are Described on Page 1. Left, Truing Up the Edge of a Cement Auger with a Special Grinder. Right, a Portable Drill Used as a Horizontal Wood-Boring Machine.

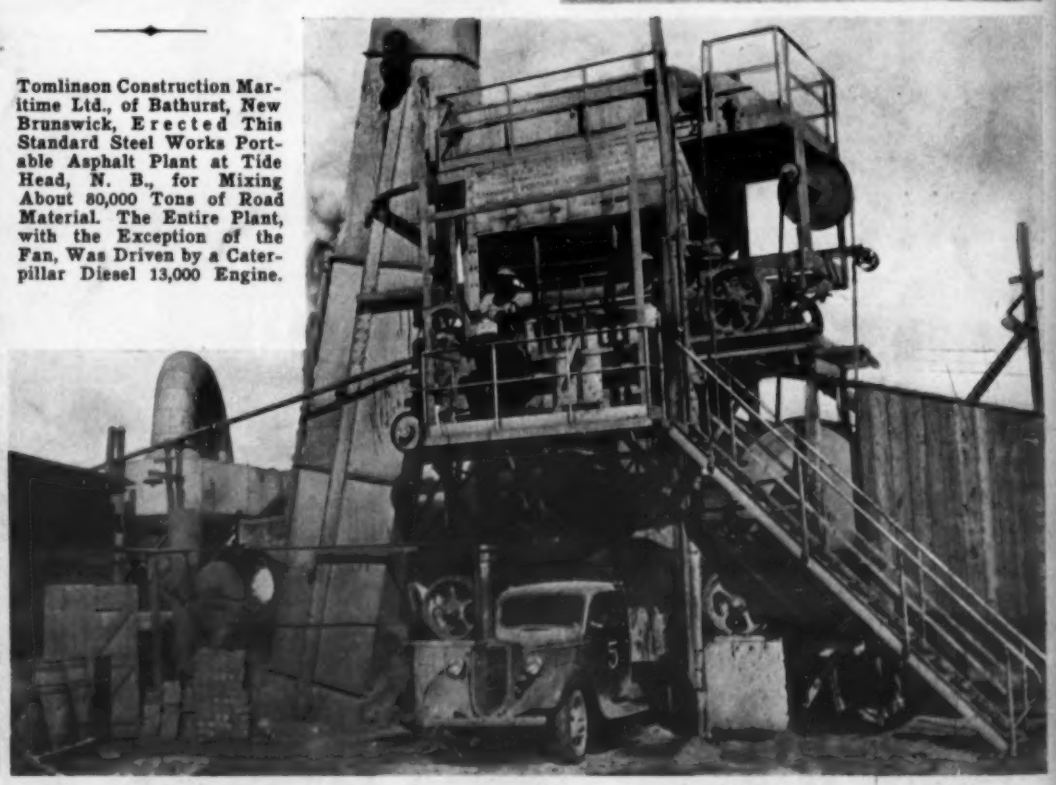


Working on a 21-Mile Stabilized Job in Minnesota. Left, a Thirty-Five Tractor Disc-Pulverizing the Binder Soil. Right, Spreading Binder Soil Over the Gravel Before Mixing. **See Page 2.**

Installing Marker Seals on Gillior's Job on U.S. 40 West of St. Louis

C. & E. M. Photo

After Using the Big Stick the Surface Was Carefully Hand-Floated. **See Page 1.**

C. & E. M. Photo

Tomlinson Construction Maritime Ltd., of Bathurst, New Brunswick, Erected This Standard Steel Works Portable Asphalt Plant at Tide Head, N. B., for Mixing About 80,000 Tons of Road Material. The Entire Plant, with the Exception of the Fan, Was Driven by a Caterpillar Diesel 13,000 Engine.